Fall 2019

A Mixed Methods Case Study of Evidence-Based Practice in a Knowledge Organization

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Recommended Citation

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2019

APPROVAL OF THE DISSERTATION COMMITTEE

This dissertation has been duly read, reviewed, and critiqued by the Committee listed below, which hereby approves the manuscript of Josh Villanueva as fulfilling the scope and quality requirements for meriting the degree of Doctor of Philosophy in Psychology.

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Abstract

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Evidence-based practice offers a key strategy for closing the gap between research and practice in organizational and management studies. This approach calls for practitioners to apply key critical thinking competencies to gather and use the best available evidence to inform decision making and action (Rousseau, 2006). As a result, efforts to try and develop the evidence-based practice capabilities of practitioners abound, mainly in the form of workshops and university courses offered by leading proponents in the field. Yet, we know little about the impact of these training approaches and whether they transfer to actual differences in practitioners' behaviors on the job, the aim of any consequential training program (Baldwin, Ford, & Blume, 2017). We also have a limited understanding of how knowledge workers might attempt to implement evidence-based management practices as compared to evidence-based practice in more established areas such as medicine (see Sackett, 2000). This study addresses the lack of understanding about evidence-based practice through a case study of a small knowledge organization using mixed methods. First, an experimental design (n=27) was used to assess whether a set of training modules focused on three core evidence-based practice competencies increases competence in evidence-based practice. In addition, non-experimental designs (n=20-31) were used to assess how competence, a disposition towards critical thinking (i.e., consistent internal motivation), and opportunities to use evidence-based competence predict application to practice. The results from these quantitative analyses revealed that the training was viewed

favorably by most and had a large impact on the competence of trainees. However, neither their competence, critical thinking dispositions, or opportunities to use predicted evidence-based practices. Qualitative semi-structured interviews (n=12) and observations of organizational meetings (n=7) were used to examine how these evidence-based practices, whether from training or elsewhere, are applied and what facilitates or hinders that process. The qualitative data were analyzed based on a grounded theory approach that yielded several key themes. For example, the data revealed that any application of competencies from this training or pre-existing abilities focused almost exclusively on research activities rather than typical practitioner tasks. For non-research activities, individuals relied on many different types and sources of evidence, often blending them in inconsistent ways. Participants also tended to communicate important evidence-based terminology inconsistently, and little formal structure guided their approach to presenting information. Patterns of responding to evidence use tended to emphasize low levels of scrutiny or not responding at all, which implicitly reinforced how individuals gathered and presented evidence. The key organizational factors driving these behaviors included organizational and team level cultural norms along with role and task demands. Finally, the reported factors influencing evidence-based practices were consistent with previous work (e.g., Barends et al., 2017) regarding the importance of time constraints and organizational culture. However, the results also illuminated several additional factors that matter when individuals have the prerequisite research backgrounds that overlap with the competencies taught in the evidence-based practice training. These factors include role and task constraints, level of group support, and leadership expectations. The results reveal the importance of understanding and leveraging the entire organizational system (e.g., training and culture) to best support evidence-based practices amongst individual practitioners.

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CHAPTER ONE: Introduction and Review of Literature

The effective use of evidence promotes successful functioning in some of the most foundational institutions of modern society, including governmental agencies, commercial businesses, non-profit entities, and many other organizations. When organizations or individuals within those organizations attempt to make decisions or act based on information from sources such as their personal experience, big data, customer feedback, coworker suggestions, Wikipedia articles, Google search results or countless other potential sources, they leverage evidence to try and improve the most important outcomes for these entities.

Yet the foundation for which that evidence relies upon and how individuals in organizations go about using it has been called into question by several management scholars (e.g., Hambrick, 1994; Rousseau, 2006). For these scholars, practitioners often settle for using evidence without critical evaluation of its usefulness for the task at hand and are cut off from certain relevant sources of information (e.g., research evidence). As a result, practitioners in all varieties of important institutions often make suboptimal decisions to the detriment of those that depend on them.

One of the many responses to the concern mentioned above includes the rise of evidence-based management (EBMgt), a type of evidence-based practice aimed at improving the decision making of managers (Rousseau, 2006). As Mintzberg (1973) observed long ago, much of a manager's responsibilities fall under the categories of 'information processing' and 'decision making' which are both central focuses of EBMgt. Applying EBMgt allows practitioners to improve their decision making by providing them a set of critical thinking competencies that enable them to find high-quality evidence and critically appraise and apply that evidence in the most effective manner possible. In support of EBMgt, practitioners must typically apply these

critical thinking competencies to their job roles when given the discretion to act freely. Finally, they must perceive that their work context gives them opportunities to apply these competencies, which can relate to any number of cues in their environment (e.g., cultural norms, work design) acting as barriers or facilitators to applying EBMgt. Therefore, consistent EBMgt in the workplace requires a combination of both organizational and individual factors to thrive.

Although EBMgt is fundamentally about actions that practitioners take in applied settings, management researchers should play a key role in supporting these practices. EBMgt advocates call on them to enact strategies for creating and disseminating research evidence useful to practitioner challenges rather than focusing on what seems interesting to other academics. Researchers should also help generate insight into how evidence-based practices function in organizations, what influences encourage their formation, their impact on organizational outcomes, and the contextual factors that create an optimal environment for them to flourish.

Unfortunately, researchers have little empirical insight into the use of organizational or related areas of research to shape evidence-based practices in organizations. For instance, Rynes and Bartunek (2017) analyzed the existing literature base on EBMgt and found that only 21% of published English language articles (of 134 total) on the topic qualified as empirical. Hence, there is a tremendous need to continue to study the topic empirically so that the insights yielded by the field of EBMgt rely on more than just the borrowed work from related fields (e.g., evidence-based medicine) and observations of academics. Given the lack of extensive research on EBMgt, academics can start by building theories about evidence-based practice behavior rooted in observations from the field and then proceed to test these theories in both controlled and applied settings.

With the proper groundwork laid by management scholars, those responsible for educating practitioners directly or indirectly must also play a role in transmitting effective evidence-based practices to individuals. Ideally, management educators can do this by enhancing the ability of their students to seek out and apply the best available evidence through critical thinking development and exposure to high-quality research evidence while acting as managers (Rousseau & McCarthy, 2007). Some scholars (e.g., Rousseau & McCarthy, 2007) have framed the development of evidence-based practice as a training or educational gap and suggested a training curriculum built around specific evidence-based critical-thinking competencies to help developing individuals improve their practice. Although promising, these solutions remain empirically untested and require further examination to assess the nature of their impact on evidence-based practice. Even in the case of individuals who adequately develop competence in evidence-based practice, researchers know even less about how they apply their competence in actual work settings. Given that students often pursue higher education for the express purpose of acquiring functional skills and knowledge (Schultz & Higbee, 2007), and research institutions devote many resources (e.g., financial) to supporting research that can inform practice, educators should feel compelled to help meet these goals. The lack of existing theories or models for understanding these processes makes this an area ripe for thorough analysis.

This study attempts to aid scholars and educators by exploring evidence-based practice in an organizational setting to understand what fosters its development and how it functions. Rousseau and Gunia (2016) describe three factors derived from Ajzen's (1991) theory of planned behavior and Vroom's (1964) theory of workplace behavior that determines the extent to which evidence-based practice takes place: ability, motivation, and opportunities to practice an

evidence-based approach. For this research, a case study approach mixing both quantitative

hypotheses (see Figure 1) and qualitative research questions was used to examine how all three

of these elements impact evidence-based practice in an organizational context. As Petticrew and

Roberts (2003) note, to build a deep understanding of the impact and process of an intervention,

mixed-methods approaches often provide an ideal way to achieve this aim.

Specifically, I examined the impact of training in developing key functional

competencies, and how these evidence-based practice competencies, critical thinking

dispositions, and opportunities to use these competencies predicts their use on the job. This

study also explores the experiences of practitioners applying this training and their general use of

evidence to learn how they integrate evidence into their work and what facilitators or barriers

exist to using these skills in a knowledge organization context. The ultimate goal is to assist

practitioners, educators, and scholars in their ability to support evidence-based practice by

providing evidence for understanding what shapes these practices and illuminating areas for

future research exploration.

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Research Questions

This case study seeks to answer the following five research questions:

1. To what extent does functional competence in evidence-based practice develop as a result of formal training in evidence-based practice functional competencies?

2. To what extent do increases in critical thinking dispositions, evidence-based practice functional competence, and perceived opportunities to use evidence-based practice lead to more evidence-based practice use on the job?

3. In what ways do practitioners attempt to apply evidence and their evidence-based skills to their work roles?

4. What facilitators do practitioners face in applying evidence-based competencies to their specific jobs?

5. What barriers do practitioners face in applying evidence-based competencies to their specific jobs?

Addressing these research questions is expected to enhance the existing literature base for EBMgt in several ways. First, research questions one and two begin to build empirically based answers to questions that have mostly been addressed through informed opinion to this point (Bartunek & Rynes, 2014; Rynes & Bartunek, 2017) by testing several specific hypotheses. For instance, this study directly assesses the effectiveness of typical evidence-based practice training approaches. The relationship between critical thinking dispositions, evidence-based practice competence, and opportunities to apply evidence-based practice competencies is also examined to see whether it predicts evidence-based practice on the job. Together the answers to these questions can help educators and practitioners develop more effective tools for fostering evidence-based practice and improving decision-making outcomes within their organizations.

This study also builds a fuller understanding of how practitioners use evidence and the facilitators or barriers that they encounter in applying evidence-based practices. Furthermore,

these insights are specific to the type of work typical for managers, rather than borrowed from other disparate areas of professional work (e.g., medical doctors) with their evidence-based practices (see Donaldson, 2009). Individual decisions or actions do not occur in isolation and often involve several organizational members (Patchen, 1974). Therefore, it is important to learn how these practices interact with their specific environment. Part of this process involves understanding which aspects of the practitioner environment might help or hurt the use of evidence-based practices so that they can be adequately addressed by proponents of EBMgt. In addition, work from the research utilization field (e.g., Beyer & Trice, 1982) suggests that there are many more forms of use for evidence than just direct application on the job that can impact organizational outcomes for better or worse. Given the dearth of research focused on other ways that evidence or evidence-based practices apply in organizations, this study used open-ended interview questions to generate a richer understanding that could also lead to future empirically testable propositions on the subject.

To create a framework that addresses the research questions above, I first describe the concept of evidence-based practice, as reflected in the EBMgt literature. Next, I detail the factors that can limit evidence-based practices in organizations. After, I elaborate on three key drivers of evidence-based practice, focusing on the different critical thinking competencies needed, the dispositions that motivate an individual to apply that competence, and the opportunities that allow a competent and motivated practitioner to use their abilities. I also detail a typical developmental approach to building evidence-based practice competence in both students and practitioners and how evidence-based practice competencies relate to application on the job. Finally, I explore what happens when an individual attempts to apply evidence or their

evidence-based practice competencies to their work and the facilitators or barriers to this kind of practice.

Evidence-Based Practice in Organizations

Management scholars originally proposed the EBMgt framework as a potential solution to what they perceived as a widespread tendency to uncritically apply low quality evidence when making decisions (Rousseau, 2006). Traditionally the framework focused on those designated as managers (see Rousseau, 2006), but ultimately it can be enacted by any individual or group participating in tasks or decisions that impact the functioning of an organization. These scholars perceived that practitioners often make decisions using evidence gathered based on convenience and familiarity, such as personal intuition or experience, and applied without regard for its value to the decision-making process or outcome. If an individual never explicitly considers the quality of the evidence they apply to a decision or action, then they cannot rule out that better information might exist and therefore they increase their likelihood of making suboptimal decisions. To combat this concern, EBMgt advocates encourage a rational model of decision making whereby managers encounter information, thoughtfully synthesize and apply evidence to recognized decision problems, and then follow through with the implementation of that decision (see Potworowski & Green, 2012; Yates & Potworowski, 2012). Hence, the decision-making process acts as the main mechanism through which evidence translates into effective practitioner performance.

The starting place for effective evidence-based practice involves a practitioner identifying the need to make a decision (Rousseau & Barends, 2011). They must then critically examine the nature of the decision at hand and the desired outcome(s), which in turn informs what evidence to include in the process. Because the desired outcomes vary based on what is valued by

individuals, groups, or organizations, there are no pre-specified ideal outcomes or types of evidence prescribed in the literature (Potworowski & Green, 2012). Instead, practitioners are expected to critically process evidence to explicitly determine what counts as the best available evidence for the current situation and why (Briner & Rousseau, 2011). As a result, evidence-based practitioners face the challenge of needing to continually bridge the gap between the demands of the environment and the suggested practices that evidence yields to ensure that their actions have the intended consequences.

For practitioners to make the most effective decisions, they need a system for classifying sources of evidence so that the evidence can be critically evaluated based on common characteristics. To this end, some of the leading advocates of EBMgt created an evidence classification scheme to guide thinking about where practitioners can find the best available evidence (Briner, Denyer, & Rousseau, 2009). In that model, they include the following four sources of evidence: research evidence (e.g., systematic reviews), locally collected evidence (e.g., data mining), stakeholder preferences and values, and managerial judgment and experience. What should be apparent from reading this list is that all practitioners are familiar with at least some of these sources (e.g., judgment, experience) and use them regularly. Because the concept of evidence used here is relatively broad, it is fair to say that all practitioners base their decisions on evidence to a certain extent. Therefore, what sets apart the everyday use of evidence from the concept of evidence-based practice is the requirement that individuals must critically evaluate the evidence available to them to determine what is most pertinent to the task at hand, and systematically apply that evidence. Unfortunately, applying a systematic approach to analyzing evidence in organizational settings appears to be much less normal (Villanueva, 2011) than the general use of evidence common to organizational life.

The current study focuses on the role of research evidence because it typically receives the least attention amongst practitioners and has the potential to produce meaningful results. Most scholars (e.g., Rynes, Colbert, & Brown, 2002) identify research evidence as the most underutilized source in organizational settings (for an exception, see Pfeffer & Sutton, 2006) to the detriment of their overall performance. This position makes sense considering that scholars borrowed many of these ideas from other evidence-based fields (e.g., medicine, nursing) where research utilization is central to the discussion (e.g., Estabrooks, Floyd, Scott-Findlay, O'Leary, & Gushta, 2003). In addition, most of the contributors come from academia and therefore have an interest in seeing the practical value of their work enhanced. However, the most important reason seems to be to address two core issues: (a) a research-practice gap exists and (b) organizational practices can significantly improve through the efforts of practitioners, consultants, educators, and researchers working together to increase the use of research. The following discussion of evidence-based practice also focuses on existing efforts to facilitate more use of research evidence in practical decision-making contexts.

The Need for Evidence-Based Practice

Organizational scholars identify several key conditions that limit evidence-based practice in organizations and thus create a need for a formal set of evidence-based practices. The most relevant conditions tend to align with the literature on the research-practice gap in organizations (see Banks et al., 2016; Rynes, 2012). They focus on issues affecting practitioners while acknowledging that the academic community plays a major role in supporting optimal evidence-based practice. These factors – each detailed below – include limited awareness or understanding of the available information for informing decisions, difficulties in knowing where and how to access this information, and problems processing the information once it is accessed.

The combined impact of each of these issues results in the need for a formal practice of evidence-based practice to ensure optimal decision-making practices in organizations.

Limited knowledge of best available evidence. First, practitioners are often not aware of or knowledgeable about the best available evidence for many of the decisions or actions they take in practice. For instance, Rynes et al. (2002) tested 959 human resources (HR) managers to see how well their beliefs aligned with practices supported by research. Respondents were only able to answer 57% of the questions correctly on average, indicating a lack of research-supported knowledge amongst participants. Pepitone (2009) and Sanders, van Riemsdijk and Green (2008) replicated this survey with general organizational managers and Dutch managers, respectively, and found similar results, suggesting the existence of a research-practice gap for human resource management practices. The overall takeaway from this line of research is that practitioners are not being educated as effectively as possible, which hinders their ability to apply the best available evidence in their work roles.

Another line of thinking challenges the notion that teaching content expertise can ever foster optimal evidence-based practices. This perspective suggests that learning in formal educational contexts will necessarily become outdated over time due to the ever-changing nature of research evidence (Rousseau & Gunia, 2016). Organizational research is rooted in the epistemological notion of fallibilism, which questions the certainty with which any knowledge claims can be made (Powell, 2000). Because all research-based knowledge is contestable and continually subject to being updated or falsified, this suggests that a singular experience, even of the duration of a formal education program (e.g., MBA), will not be enough to develop and maintain evidence-based practice.

Accessing evidence. Even with a high-quality education in a specific area of expertise, there is always a need to seek out more evidence to address the wide range of issues that organizational contexts present (Rousseau & Barends, 2011). There are two types of accessibility of evidence that are most relevant to evidence-based practice: availability of the resource containing the information and cognitive accessibility of the information. First, an individual cannot gain exposure to evidence when the actual physical or digital resource is not made available for them to use. Second, even when they have this access, the actual written or depicted information may be presented in such a way that the individual cannot understand the meaning. In both cases, practitioners who may otherwise desire to use evidence in their practice will be unable to do so without external support.

Academic knowledge typically resides in peer-reviewed journals, and practitioners can find the expense and effort of accessing these journals an insurmountable barrier. Whereas access to research databases is generally standard in university settings, most organizations do not prioritize funding for this type of access. This lack of easy access places the burden to acquire this information on the financial resources of the individual practitioner as well as their ability to search for and find the limited amount of freely available evidence. Although using resources such as public libraries can offer one way to mitigate this access problem, the reality is that these steps take a tremendous amount of time and effort relative to accessing other sources of information (e.g., coworker suggestions). Hence, it is no wonder that there is a growing consensus that practitioners often do not access the available research evidence even when it could inform their decision making (see Rynes et al., 2002).

Even when individuals can gain physical or digital access to this information, they often find that the technical demands of effectively interpreting the information mean they are unable

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to understand and apply the material. Many individuals pursue degrees that are not research-oriented and are unlikely to practice the technical skills involved in interpreting academic journals. Even when individuals encounter strategies for finding research, they often focus on preparing for academic endeavors such as creating a literature review for a research study rather than searching for information to make expedient decisions. Several other sources of information including coworkers or organizational data are much more easily accessed and therefore are likely to be preferred even when the information is less useful to address the issue at hand.

Evidence-based practice explicitly calls for seeking out the best available evidence, yet accessing the vast collection of high-quality evidence from the research world remains an enigma to many practitioners. Quite often, they do not know how to efficiently search for information, which discourages them from wanting to invest the time to search when many readily available alternatives (e.g., personal experience) already exist. Evidence-based practice techniques help them frame their search to effectively filter the best available evidence and address the issue currently being faced (Rousseau & Barends, 2011). There is also a need to understand various search strategies that allow an individual to navigate the fragmented landscape of organizational research. Both the framing of a search and employing specific search strategies are competencies needed to help practitioners to enhance their ability to access research evidence.

Limitations in information processing capabilities. When practitioners can access research evidence more frequently, then its actual application will be highly dependent on the way the individual processes that evidence. The individual processing of research findings by practitioners represents one of the more formidable obstacles proposed in the organizational

literature. Once again, the existing evidence suggests that many practitioners process research evidence unfavorably in comparison to the alternatives. For example, Villanueva (2011) found that research evidence was the least influential type of evidence reported by managers for making a hypothetical decision. Practitioners have exhibited unfavorable attitudes regarding research evidence for at least a century (e.g., Churchman, 1964; Donham, 1922; Dunnette & Brown, 1968; Hambrick, 1994; Hilgert, 1972; Rynes, 2012), and the emerging evidence seems to now be confirming that view. These unfavorable attitudes hold profound implications for how information is processed as they act as filters for what information is sought out and retained for use.

There are several tendencies or biases in human information processing that have the potential to impact the uptake of research information. For instance, recipients of research information reinterpret that information according to many individual and environmental characteristics (see Kieser, Nicolai, & Seidl, 2015) including pre-existing beliefs and previous experience. Decision-makers are also naturally inclined to think of assumptions and then find evidence to confirm these assumptions (Larrick, 2009), contrary to the advice of EBMgt scholars. In addition, Hample (1978) notes that recipients of information tend to fill in the implied evidence when not explicitly provided. Hence, the recipient heavily influences the construction of meaning for research claims and associated evidence. Given these factors, individuals could interpret and act upon this information in an altogether different way than what the researcher intended when publishing or otherwise communicating their findings. This scenario presents a major challenge to the use of information to effectively impact practice because the research may be reimagined to be consistent with personal experiences or existing knowledge rather than acting as a learning opportunity for the practitioner.

Practitioners also process research evidence according to their pre-existing attitudes

towards research findings and the accessibility of these attitudes. For instance, they attend more

to attitudes with a specific target of influence (Rhodes & Ewoldsen, 2013). This finding gives

credence to the notion that asking practitioners about their attitudes towards research findings

(e.g., Barends et al., 2017) can inform us about how they process research information in

practice. Direct experience with an object also predicts both accessible attitudes (Fazio & Zanna,

1981) and favorable attitudes towards that object (Bornstein, 1989; Gordon & Holyoak, 1993;

Zajonc, 1968). The implication is that practitioners who use research evidence increase their

positive perceptions of such evidence and are, therefore, more inclined to use it in future

situations. This implication suggests that the educational solution mentioned above which

exposes practitioners to research in hopes of building more favorable attitudes towards its use

could be effective. However, many practitioners never receive this exposure to research and

experience other types of information more frequently, hampering the chances that they consider

research findings during decision making.

Another concern often discussed within the EBMgt field is how individuals evaluate

statistical information. Rynes (2012) contends that given practitioners generally struggle with

interpreting and accepting probabilistic large-sample research findings across domains ranging

from law to medicine to employee selection, the problem might be fundamental to human

information processing. According to many authors, a significant portion of the population

struggle to understand the content in research studies due to low levels of statistical literacy

(Ayres, 2008; Best, 2001; Paulos, 2001). Others question whether this perceived deficiency has

less to do with inability and more to do with an individual's perceptions of statistical information

as too abstract (Ungson, Braunstein, & Hall, 1981). Still, other research from the persuasion and

influence fields seems to indicate that statistical evidence is often the more influential evidence type (Hoeken & Hustinx, 2009; Hornikx, 2005). These findings imply that level of understanding aside; individuals may still feel compelled by statistical evidence under the right circumstances. Becoming an evidence-based practitioner involves building a better understanding of statistical evidence and how to apply it to practical decisions.

A final issue in practitioners processing information comes from the tendency not to practice or develop critical thinking habits in an individual's formative years. Briner et al. (2009) specify that EBMgt is about "taking what can be a fairly automatic approach and making it more explicit, mindful, critical, and systematic" (p. 22). Unfortunately, the ability to think in such a critical capacity may be fundamentally lacking in most people. The lack of attention to developing these processes in formal education and the unlikelihood that certain types of thinking habits will develop naturally supports this notion (Ritchhart & Perkins, 2005). As a result, EBMgt scholars favor the training of critical thinking skills through education or alternative approaches (Rynes, 2012). These critical thinking abilities are meant to overcome some of the limitations of spontaneous processing of research in favor of the more deliberative processes described above. Barends and Rousseau (2011) suggest that sharpening these critical faculties should lead practitioners to regularly ask the question "what's the evidence for that?" (p. 6) as they encounter various organizational beliefs, practices, or decisions. The next section describes the foundational pieces of effective evidence-based practice that help address these core issues of limited knowledge of evidence, barriers to accessing evidence, and limitations in information processing capabilities.

Components of Effective Evidence-Based Practice

Effective evidence-based practice incorporates elements common to all individual workplace actions. Rousseau and Gunia (2016) describe three different components that are part of effective evidence-based practice based on the Ability, Motivation, Opportunity (AMO) framework of individual workplace behaviors. The components include individuals having the necessary competence (i.e., ability) to practice in an evidence-based manner, being disposed (i.e., consistently motivated) to apply this competence regularly and having opportunities in their work roles to apply their competence.

Evidence-based practice competence. Competence in evidence-based practices represents the cornerstone of an effective evidence-based practitioner. As with any set of individual competencies, these practitioner competencies must be developed at some point throughout an individual's life, either before joining an organization or during their time with that organization. Finally, individual competence only matters for organizational outcomes when applied to actual work tasks or decisions. The following sections elaborate on what gets developed in competent evidence-based practitioners, how educators have developed competence in practitioners or students to this point, and how developing that competence links to using it on the job.

Components of competence in evidence-based practice. As with any performance in an organizational context, individuals must possess capabilities that allow them to perform certain actions reliably. Many of the skills necessary for evidence-based practice directly address the limiting factors illustrated above. Rousseau and Gunia (2016) describe the need for foundational and functional competencies to implement evidence-based practices properly. *Foundational competencies* refer to general critical thinking processes as well as technical domain knowledge (i.e., expertise) that one might acquire in an MBA course or professional training. The

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functional competencies focus on specific applications of general critical thinking skills and

historically emphasize the following skills: asking a framing question, acquiring the appropriate

evidence to answer the question, appraising its quality, applying evidence to the task at hand, and

assessing the result (Sackett, 2000). This set of functional competencies is expected to help

practitioners access the best available evidence, minimize the effects of information processing

limitations, and to generally stay informed of the latest knowledge in one's area of practice.

Practitioners must first recognize that they should take some decision or action and then

formulate an answerable question to help address this call for action to properly initiate an

evidence-based practice process (Rousseau & Barends, 2011). Unlike a research question, these

questions should be based entirely on a matter of practical importance and directly inform a

decision or action. Practitioners should structure their thinking around an issue and get specific

about what they need to know so that they can effectively sort through the copious amounts of

organizational research available. Often the use of tools such as the PICOC (Population,

Intervention or Success Factor, Comparison, Outcome, Context) acronym can help practitioners

decide what to include in their focused question.

Based on the effective formulation of a question, a practitioner can then employ strategies

to optimize the process of searching for evidence. These search processes typically involve

using online databases of relevant journals. For practitioners trying to make rapid decisions, the

focus might be on finding systematic reviews or other forms of evidence summaries rather than

reading through much of the original research as a researcher would typically do for a literature

review search (Rousseau & Barends, 2011). Practitioners must also learn to formulate a search

strategy that allows them to decide what publications to review and what to skip. A typical

strategy might include identifying the keywords from the formulated question and searching for

articles matching with key terms and synonyms along with reviewing the reference sections of the selected articles to find additional relevant articles.

Once data is collected, individuals must appraise and apply it to an issue or decision. Appraisal involves deciding about the quality of the evidence and its suitability for use with the existing situation. Individuals typically learn how to use guidelines and checklists to help them consistently evaluate the key issues of internal validity, impact (i.e., effect size), and relevance of the evidence (Rousseau, 2006; Rousseau & Barends, 2011). The focus is on how to examine research questions, study design, and outcomes to make a proper appraisal. Once high-quality evidence is in hand (which is no guarantee to occur), practitioners then learn how to decide on incorporating that evidence with their knowledge of stakeholder concerns and local contextual issues as well as the expertise of the individuals involved with the decision. For instance, practitioners must decide on whether something about the context or stakeholder interests might render the evidence they found not applicable or needing adjustment to use effectively.

Finally, once practitioners decide, they must evaluate the outcome of the process. Practitioners should learn evaluation techniques such as comparing pre-post data for the outcomes of interest and deciding whether the intended effect was produced. In some cases, preexisting evidence might not exist; therefore, evidence-based practitioners benefit from developing their skill in procuring or developing research tools such as surveys and interview protocols to collect new evidence. To disseminate the information for action, practitioners must also develop skills in communicating evidence. Ultimately the practitioner must be competent in managing every step of the process, from generating focused questions to finding, assessing, and applying that information and determining the results of a course of action. The next section

addresses how many educators have attempted to cultivate these competencies in current and future practitioners all over the world.

Developing competence in evidence-based practice. After establishing a need in the literature for more evidence-based practice and a blossoming understanding of what evidence-based practice should entail, many proponents (e.g., Rousseau & McCarthy, 2007) set their sights on finding ways to develop more evidence-based practice amongst practitioners. The key components of evidence-based practice are all considered amenable to development (Rousseau & Gunia, 2016). Therefore, much of the literature on evidence-based practice discusses ideas on how to foster various sets of skills and techniques for becoming a better practitioner. Workshops and university-based courses appear to be the main tool of the trade, often developed from academics who have taken a deep interest in this topic. The typical focus for this training involves functional competencies rather than working on core critical thinking abilities or domain expertise. The idea is to maximize limited time with students by focusing on specific functional manifestations of those underlying skills given that developing domain expertise and basic critical thinking skills takes lengthy periods of learning and practice (see Ericsson, 2009).

The existing EBMgt literature houses much of the training material on evidence-based practice for the organizational context. Researchers and practitioners in the field have published many training resources, and teachers in this area frequently get together to demonstrate or discuss best practices. For instance, the Center for Evidence-Based Management (CEBMA) collects these resources on its website and actively works to develop material to help educators and trainers teach evidence-based practices. Currently they host a collection of PowerPoint presentations and interactive online learning modules that are used around the world to teach evidence-based practice. The curriculum mostly focuses on exposing practitioners to the concept

of evidence-based practice as well as skill development in the functional competencies of formulating questions, searching for evidence, appraising evidence, and to a much lesser extent, the application of evidence. Skill development in the application of evidence is not often covered in the available curriculum, likely due to a lack of understanding of just what is involved in integrating different forms of evidence effectively.

Unlike other practice areas with more extensive evaluation of evidence-based practice training such as medicine (e.g., Coomarasamy & Khan, 2004), little to no published research on the effects of training in the organizational domain exists to guide decisions about content, design, and other issues. In the domain of organizational practice where a large gap between research and practice is alleged to exist (see Rousseau, 2006), the potential effects of such training are expected to be large. Therefore, the current study examines the extent to which practitioners develop the functional competencies of evidence-based practice through these typical training approaches.

Hypothesis 1: Exposure to training in evidence-based practice will lead to increased evidence-based practice functional competence.

Using evidence-based practices on the job. As with any learning, its value stems from practitioners transferring learning from the training environment to organizational practices. However, evidence-based practice educators and trainers often must design their educational experiences for students (e.g., Rousseau & McCarthy, 2007) whereby it is unclear if and how this transfer takes place. For example, we lack any clear indication beyond anecdotal accounts of instructor's experiences of just how effective training in evidence-based practice can be in the domain of organizational and management studies. Do those who develop the functional competencies of evidence-based practice, whether through formal training or other means, go on

to become evidence-based practitioners, and to what extent do they do so? This study attempts to examine this issue directly by looking at how varying levels of evidence-based practice functional competence translates to observed behaviors on the job.

Although the transfer of evidence-based practice with organizational research requires further exploration, several reasons exist to believe that practitioners would apply this type of learning on the job. For instance, general critical thinking skills for which evidence-based practice functional competencies emanate predict several different types of performance (often to large effect), including on the job (Watson & Glaser, 2010). In the case of the current study, specific critical thinking competencies for evidence-based practice are being considered in relation to particular markers of evidence-based practice, theoretically enhancing the strength of this relationship. Finally, evidence-based practice training has successfully translated in other areas such as medicine or healthcare to changes in participant behaviors (Wong, McEvoy, Wiles, & Lewis, 2013). Hence, there is strong reason to believe that this type of training will be impactful for the typical practitioner applying organizational research.

Hypothesis 2: Functional competence in evidence-based practice will be positively associated with evidence-based practice.

Critical thinking dispositions. A consistent theme in the EBMgt literature calls for deliberately processing information when making decisions (e.g., Briner et al., 2009), which implies a prominent role for motivation in driving the application of the foundational and functional competencies mentioned above. The concept of critical thinking dispositions captures an individual's motivation towards applying their critical thinking abilities in this way (Halpern, 1998; Paul, 1992). Facione (2000, p. 65) defined critical thinking dispositions as "consistent internal motivation to engage problems and make decisions by using critical thinking."

Therefore, the current study examines whether a disposition towards critical thinking (considered broadly) motivates individuals to practice in an evidence-based manner.

Fazio's Motivations and Opportunities as Determinants model (MODE; Fazio, 1990; Olson & Fazio, 2009) offers a way of understanding when a deliberative approach to processing information will be triggered. The model suggests that motivation is one of two critical factors (the other being opportunity) in invoking more deliberative processing of information. Motivation can encompass factors such as being accountable for the outcomes of a decision or a desire to appear unbiased that make the situation feel as though it could be consequential for the decision-maker. Once this deliberate processing of information is triggered, a more thorough assessment of the pros and cons of a course of action, one's ability to execute a course of action, and the social acceptability of doing so are likely to be triggered (Rousseau & Gunia, 2016). Alternatively, when spontaneous processing of information occurs, managers will favor more accessible sources of information (Rhodes & Ewoldsen, 2013). Given that this is highly likely to favor other forms of evidence than research, the suggestion from EBMgt scholars to encourage more deliberative processing seems well-founded.

The main behaviors involved in evidence-based practice include critical thinking competencies that are driven by the type of deliberative processing discussed above. For instance, individual differences in dispositional characteristics such as the need for cognition and need for cognitive closure can impact the thinking that individuals tend to use in addressing everyday situations (Facione, 2000; Ritchhart & Perkins, 2005). Facione (2000) identified a specific set of dispositions (i.e., habitual ways of acting) that can account for the motivational tendencies to participate in critical thinking and make up an overall disposition towards this type of thinking. These include the following: "the disposition toward truth-seeking or bias, toward

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open-mindedness or intolerance, toward anticipating possible consequences or being heedless of them, toward proceeding in a systematic or unsystematic way, toward being confident in the powers of reasoning or mistrustful of thinking, toward being inquisitive or resistant to learning, and toward mature and nuanced judgment or toward rigid simplistic thinking (California Critical Thinking Disposition Inventory, n.d.)." In general, these critical thinking dispositions are cognitively accessible and relatively stable components of an individual's character and, therefore, are ideal predictors of individuals applying evidence-based practice competence.

Hypothesis 3: Critical thinking dispositions will be positively associated with evidence-based practice.

Opportunity to use evidence-based practices. Even with a properly trained and motivated individual, the context in which they perform can hinder their actual use of evidence-based practices. Learning and development scholars have noted the volume of empirical work supporting the powerful role opportunities play in allowing an individual to apply their skills on the job (Burke & Hutchins, 2007; Grossman & Salas, 2011). Factors such as laws, policies, regulations, traditions, the scope of formal authority, cultural norms, politics, and countless other factors can all play a role in determining how information is processed and used (see Potworowski & Green, 2012; Yukl, 2010). These factors are suspected to heavily influence the type of information that practitioners have access to, the places they look for new information, the demands for evidence when making decisions, and pressures for legitimizing their behavior. Hence, this study assesses the effect of opportunities to apply evidence-based practice competency has on encouraging actual evidence-based practice on the job.

As noted above in the MODE model, opportunity is a key driver of adopting a deliberative approach to making decisions. Opportunity refers to the availability of sufficient

resources (e.g., time, cognitive) to go through a deliberative process (Fazio, 1990). Practitioners must have the time and attention to be capable of thinking deliberately. These are particularly serious considerations given the common refrain of practitioners that time and attention are in limited supply. The policies, procedures, and other organizational structures in place for an organization directly shapes the availability of these resources. For instance, Rich (1991) argues that organizational rules and procedures limit the nature of information search processes that individuals might carry out. These factors can act as an impediment even for someone who possesses the skillset to carry out effective searches. Larrick (2009) also points out that typical organizational processes discourage independence and dissent which constrains the amount of thinking that occurs in these environments, thus acting as a barrier to transferring any learning from evidence-based training. The combination of these socio-cultural forces and other factors described above mean that even the properly trained and motivated practitioner can run into problems in trying to implement evidence-based practices effectively.

Hypothesis 4: Opportunities to apply evidence-based practice competencies will be positively associated with evidence-based practice.

The Practitioner Experience of Evidence-Based Practice

The above hypotheses focus on specific issues that are commonly recognized in the literature on individual applications of evidence-based practice (see Rousseau & Gunia, 2016). However, the reality given the lack of research specific to the topic of EBMgt is that there is probably a lot more that is unknown than known about the topic. For instance, while evidence-based practice advocates make many recommendations about best practices for using evidence in organizations, it is less clear what practices practitioners use when left to their discretion. In addition, for those who try to apply effective evidence-based practices, what kinds of

environmental factors help or hinder their efforts? Furthermore, previous research into these questions tends to focus on frameworks from other fields (e.g., Medicine; Barends et al., 2017). The following sections describe an attempt to build a deeper qualitative understanding of what these activities look like that are rooted in the daily activities of a model organization.

Applying evidence-based practice competencies.

Knowing how to apply evidence and evidence-based practice competencies in an organizational context can help illuminate key strategies for improving the evidence-based training currently taking place. For instance, work in research utilization studies (e.g., Beyer & Trice, 1982) reveals several ways in which practitioners might try and use research in practice. They might use it for immediate action (as called for by most evidence-based practice proponents) by taking the information and applying it to some decision or problem at-hand. Alternatively, they could use it as a tool for learning, thereby increasing their knowledge on the topic. Finally, they could use it to gain legitimacy for some course of action by associating the evidence with that course of action. In addition, there are potential unanticipated consequences of applying evidence-based practice competence that are not likely to be reflected in traditional quantitative assessments. The current study attempts to build a broader notion of the use of evidence-based practice competencies within an individual's specific organizational context.

An open-ended approach to exploring the evidence use patterns and evidence-based practices can also illuminate alternate ways in which organizational systems support or discourage effective practices. For example, a lack of knowledge of research evidence does not necessarily preclude practitioners from using this evidence in an organizational context as they can introduce it at any moment. They only need to have access to research evidence at the time of deciding or taking some other action. This situation can occur when an individual searches

for information to help inform an ongoing decision process, or one or more members of a group introduce research evidence for all to consider as part of the group decision-making process. Understanding the myriad ways in which practitioners navigate existing organizational systems to apply evidence and evidence-based practices is, therefore, a priority of this study.

Research Question 1: In what ways do practitioners apply evidence and their evidence-based practice skills to their work roles?

Facilitating evidence-based practice. In addition to understanding how practitioners apply evidence-based practice competence, it is also useful to understand the facilitating conditions that help them use their competence in a specific performance context. For example, decision supports such as tools, rubrics, processes, and routines can enhance the application of evidence-based practice competencies by reducing human information processing biases and limiting distractions in the environment (Rousseau & Gunia, 2016). The transfer of training literature also indicates several factors that encourage the use of general skills or knowledge obtained from training, such as characteristics of the trainee, transfer climate, support of peers and supervisors, and post-training follow-up (Grossman & Salas, 2011). These experiences have the potential to influence everything from an individual's willingness to apply evidence-based practice competencies, to the value they perceive for the organization in doing so, and the resources or rewards they receive for these activities. However, there is little understanding of the factors that are most salient for enhancing evidence-based practice for individual practitioners. Therefore, a proper starting place is to explore the experiences of individuals applying evidence to their work roles to build an understanding of the factors that might best precipitate effective evidence-based practice.

Research Question 2: What factors facilitate practitioners applying evidence-based competencies to their work?

Barriers to evidence-based practice. While several factors aid practitioner use of evidence-based practices, there are also several barriers to practitioners using these practices. Although it is clear from the prior discussion on the importance of opportunities in effective evidence-based practice that many potential constraints exist to applying this type of competence, there is little direct evidence of which factors are most salient. A limited number of studies have proceeded under the assumption that the research-practice gap is a significant problem and assessed perceived obstacles or barriers to managers using research evidence in their practice (Barends et al., 2017; Duncan, 1974; Howells, Neveda, & Georghiou, 1998; Offerman & Spiros, 2001; Rynes et al., 2002). This line of research is important for examining the reasons behind the lack of research utilization discovered in other studies.

Barends et al. (2017) identified six key barriers or obstacles to applying research. First, respondents reported a lack of time in their work roles to gather and apply research. Respondents also mentioned that they were sometimes unaware of the research resources that could help them, and when they were aware, they did not have access to that information. In addition, they also referred to their inadequate understanding of scientific research as well as academic writing being difficult to understand as factors limiting their consumption. Finally, some respondents identified the culture of their organizations as a limiting factor in any attempt to apply research on the job.

However, many of these studies base their definitions of perceived barriers around assertions from the literature on EBMgt or borrow from findings in other areas of evidence-based practice such as medicine (e.g., Tierney, Kislov, & Deaton, 2014), making it uncertain how well

these suggestions reflect the reality of organizational practice. Furthermore, it is difficult to get a clear picture of the full array of barriers from self-report studies such as these when many of the participants also report having little or no experience with research. For instance, Barends et al. (2017) reported that only 14% of their sample had ever read a peer-reviewed academic journal. If most of the surveyed individuals cannot get past the first step of gathering evidence, it makes it difficult to assess some of the barriers that are likely to emerge (e.g., others offering conflicting evidence in discussion) during later steps of the evidence-based practice process.

 Research Question 3: What barriers minimize or prevent practitioners from applying evidence-based competencies to their work?

CHAPTER TWO: Study Design and Methodology

In this study, I used a combination of quantitative and qualitative research designs to explore how evidence-based practice occurs within a single organization. As such, the entire research study is best described as a case study of the development and application of evidence-based practice in its organizational context. As noted by Yin (2014), case studies reflect a type of research strategy that can incorporate many different quantitative and qualitative approaches to understand the phenomenon of interest better. The first element includes an experimental design to assess how the introduction of a formal training program impacts the evidence-based practice competence of employees in the participating organization. Additionally, I used non-experimental approaches to assess how evidence-based practice competence, critical thinking dispositions, and opportunities to use evidence-based practice competence predict use of evidence-based practices. Finally, I used a combination of interviews, group observations, and open-ended survey responses from managers to understand how individuals within the organization try to apply evidence and their evidence-based practice competence as well as the facilitators and barriers they encounter in action.

The participating organization used for this research is a hybrid consulting-research firm focused on leadership development, with an emphasis on the creation and utilization of high-quality evidence within the organization. The organization is part of a graduate-only university in the Southern California region of the United States, but is functionally independent of the university. This organization features all the hallmarks of a typical knowledge organization with its focus on knowledge-based products and services and the development of the knowledge and skills of its employees as its core asset. For all these reasons, I purposely selected it for this

study as it is expected to prominently feature the phenomenon of interest – evidence-based practices – in normal organizational activities.

The research perspective provided here reflects that of a hybrid between insider and outsider perspectives. As one of the main co-founders of the organization and amongst only a handful of people involved with the organization from its beginning, I have a deep level of understanding of the inner workings of the organization, its culture, the major players involved, and the strategic initiatives driving the work of everyone in the organization. Hence, I was able to understand virtually all the referenced projects or insider jargon used by participants. On the other hand, I was transitioning out of the organization and attending only manager meetings and working on a solo project for the organization at the time of the study. As Tietze (2012) notes, researching your own organization involves a balancing act between strangeness and familiarity to develop a deepened sense of what the researcher likely has preconceived ideas about that was ideally achieved under these circumstances. The use of standard research practices such as assuring confidentiality of information and independent review of the research protocol allowed me to minimize any potential concerns over conflicts of interest.

Participants

The employees of this organization that participated in the study included 43 Masters and Doctoral students from a graduate-only university and one tenured faculty member. Employees fill a variety of role types, including consultants, technical specialists, interns, and managers. For instance, participants mentioned the following sample of tasks for which they are responsible: general management of employees, external coaching, program development and administration, strategy implementation, onboarding, training, succession planning, financial management and accounting, and leadership development research projects. Hence, their profile

fits with the scientist-practitioner model that scholars often refer to as ideal for bridging academic-practice issues (see Rynes & Bartunek, 2017). Table 1 breaks down their characteristics.

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During the study, there were significant dropout rates for the training and follow-up assessments attributable to schedule conflicts and typical overwhelming time commitments for graduate students. This explanation fits with problems associated with the first cohort along with the explanation given directly by just about everyone who declined to participate. Further, several factors were checked to see whether they predicted dropout, including attitudes towards evidence-based practice, pre-training competence scores, education level, pre-training ratings of evidence use, and critical thinking disposition scores. None of these factors showed a statistically significant relationship with dropout at an alpha level of .05.

Most of the organization participated in the qualitative elements of this study. For instance, I scheduled twelve employees for interviews based on a combination of opportunistic and operational construct sampling, where participants exhibited the phenomenon of interest and cover different levels of the organizational hierarchy. Guest, Bunce, and Johnson (2006) suggest that theoretical saturation of data can be achieved whereby no new themes or insights are generated at about twelve interviews (less for homogenous populations). A total of seven total meetings, most of the available meetings during the data collection period, were attended. These meetings covered recurring department meetings as well as working sessions across all functions and levels of the organization (see Table 2). Most of the organizational members were present for at least one of these meetings.

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Experimental Intervention

Employees of the organization were asked to participate in a series of workshops and skills training exercises (see Appendix A) aimed at developing the functional evidence-based practice competencies (see Rousseau & Gunia, 2016) of internal employees. Specifically, I targeted the following competencies: question formulation, evidence search, and evidence appraisal. I targeted these competencies due to the prevalence of training material being used to teach them and available tools for measuring their development. As noted above, one group received the training before assessment of their competence in evidence-based practice, while the other received the training after to compare the effects of the training on the abilities of the employees. I expected the effect to be very large based on effect sizes from other areas assessing evidence-based training (e.g., Wong et al., 2013).

To develop the training, I adopted materials from publicly available material published by CEBMa (Center for Evidence-Based Management Teaching Materials, n.d.) on their website. The published material is a compilation of training resources that are applied broadly by experts in evidence-based practice to undergraduate and graduate populations as well as business professionals around the world. In developing this training series, I attempted to adhere to the source material as closely as possible to allow for assessing its effectiveness (see Appendix B).

Quantitative Measures

Evidence-based practice functional competence. I measured the functional competence of the study participants using a modified version of the Adapted FRESNO Test of Competence (AFT) in Evidence-Based Practice (McCluskey & Bishop, 2009). This adapted form has a typical Cronbach's alpha level of .74. For this study, I used a modified version of the AFT from CEBMa (see Appendix C) as it focuses on general management or organizational

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issues rather than clinical scenarios, making it more appropriate for organizational employees. The CEBMa AFT-Mgt version also contains an additional section that captures attitudes and familiarity with evidence-based practice, attitudes towards research evidence, and use patterns for academic databases through 16 multiple choice and Likert scale items. The second part then provides two organizational scenarios and asks ten different questions which call on participants to apply the various functional competencies of evidence-based practice to address one of those scenarios. The competence scoring involves an expert comparing answers on all test questions from part two with that of a grading rubric (see Appendix D) to allocate a total score for the entire section, with a total possible score of 164.

 Evidence-based practice use. I adapted the Perceptions of Evidence Use Scale from Jepson and Rosseau (2016) to determine whether employees utilize evidence-based practices in the workplace (see Appendix G). The original scale features twelve questions asking an employee to assess the evidence-based practices of their supervisor. The scale was adapted to have managers or others who oversee the work of employees rate the evidence-based practices for this study. One benefit of having managers rate evidence-based practice use for their employees is to minimize potential common method variance effects (see Podsakoff, Mackenzie, Lee, & Podsakoff, 2003) with the relevant hypotheses in this study. I recorded responses on a five-point Likert scale ranging from 'strongly agree' (5) to 'strongly disagree' (1). The Cronbach Alpha for this instrument is .96 (Jepson & Rousseau, 2016). For all scales in this study, observed Cronbach Alpha values were not calculated due to their unreliability in sample sizes under 200-400 participants (see Charter, 2003) and the lack of availability of item-level data for some measures.

Critical thinking dispositions. I assessed the willingness to apply critical thinking skills to one's life experiences through the use of the California Critical Thinking Disposition Inventory (CCTDI). This survey asks respondents to rate the extent to which they agree or disagree with 75 statements expressing familiar opinions, beliefs, values, expectations, and perceptions related to forming sound judgments, using a six-point Likert scale ranging from 'strongly agree' to 'strongly disagree.' This test has been validated with both student populations and business professionals (Facione, 2000), making it suitable for application in this case. The test results yield an overall disposition score as well as seven subscale scores for the following critical thinking dispositions: Truthseeking, Open-mindedness, Analyticity, Systematicity, Confidence in Reasoning, Inquisitiveness, and Maturity of Judgment. I only used the overall disposition score which represents the sum score of the individual scales in this analysis. This overall score features Cronbach Alpha levels typically above .90 (What is the Reliability of the CCTDI, n.d.).

Opportunity to use evidence-based practice competence. I adopted a set of basic questions from the Learning Transfer System Inventory (LTSI; Katsioloudes, 2015) for this study to assess participant's perceptions of their opportunities to use evidence-based practice competence in their work roles (see Appendix F). The 'Opportunity to Use Learning' scale reflects the environmental constraints that an individual might face in trying to apply their learning on the job. Hence, it presents an ideal way of measuring an individual's opportunity to apply their evidence-based practice competence. The scale features four questions posing statements that ask the extent to which respondents agree. Each question uses a five-point Likert scale ranging from 'strongly agree' to 'strongly disagree.' This test has been validated primarily

in organizational settings with reported Cronbach Alpha levels ranging from .77 to .78 for the latest version (Bates, Holton, & Hatala, 2012; Katsioloudes, 2015).

Qualitative Measures

To capture the experiences of organizational members in trying to apply their evidence-based competencies, a semi-structured interview guide was created to collect open-ended responses. I assessed the following topics: ways in which they attempted to apply training, aspects of the organization that facilitated applying training, barriers to applying training, what type of assistance they think might help them apply their training more effectively in the future, and ways in which evidence is applied in the organization (see Appendix H). I interviewed participants following the general structure of the guide while also asking probing follow-up questions and exploring relevant areas of interest based on their understanding of the organizational context. The unfolding data collection effort called for a less structured approach to properly explore the topics above, so the interview guide was used flexibly (see King, 2004). Specifically, a less structured approach allowed for a much richer exploration of the frameworks for which participants were using to understand evidence-based practice and how it applied to their work. I generally followed the main set of questions, but also asked additional probing questions as needed to explore relevant experiences or thoughts as presented. All interview audio was recorded to allow for later analysis of the data.

In addition to the interview guide, an observation guide (see Appendix I) was created to guide the observations of organizational meetings and work sessions. The focus was on capturing observations related to the three qualitative research topics in this study: ways in which practitioners apply evidence, facilitating factors for evidence use, and barriers to evidence use. Given the need to create a conception of this phenomenon outside the existing literature, the

guide was meant to be brief and open-ended. The guide focused me on collecting descriptive notes from the meetings, but given my insider status additional interpretive notes were collected. Finally, the guide was reviewed after each observational session and updated as necessary to add any areas of focus that would improve the quality of information collected for the study (see Länsisalmi, Peiró, & Kivimäki, 2004). I recorded audio from each meeting (when possible) to assist in recall of session contents during analysis.

Procedure

All eligible members of the organization participated in three stages of the study over several months (see Figure 2). These stages included a pre-experimental stage that occurred before training, the experimental intervention stage, and the post-experimental stage. Two separate cohorts of participants went through the process over two separate periods with the schedules for these two cohorts sometimes varying based on seasonal work patterns of the organization. Two rounds of data collection were deemed necessary to reach the required sample size for testing the study hypotheses.

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In the pre-experimental stage, the immediate supervisors of all members rated their use of evidence-based practice on the job. The survey asked for raters to consider the employee's performance over the last six months using an online survey platform. Concurrently, participants were asked to complete the CCTDI online to capture their critical thinking dispositions.

During the experimental stage, I randomly assigned half of the employees to an experimental condition by generating an anonymous numerical id and sorting the group using that numerical value. Those in the experimental condition first received a set of training modules and an assessment of their evidence-based competence. A control group took this same

assessment of evidence-based competence before participating in the training modules. I

administered the first two modules of the training based on my expertise with the topic and

experience in training facilitation in groupings of 1-4 participants. Most the training sessions

were one-on-one and lasted from 60-90 minutes depending on the number of participants and the

needs of the learners. After completion of the initial sessions, participants were instructed

verbally and through later email follow-up on how to proceed with the third online module on

interpreting evidence. For the first cohort, of the original 21, seven ended up completing the

training in its entirety. For the second cohort, only one person of 13 declined to participate in the

training due to their workload, and seven people completely finished.

The post-experimental stage asked for managers to again rate the use of evidence-based

practices on the job. The length of time varied by cohort due to differences in the seasonality of

work schedules. In the second administration, raters are asked to consider the post-training

period (6 months for the first cohort and six weeks for the second cohort) and are also asked to

respond to an open-ended question regarding how they have noticed their employees using

evidence in their organizational practices. Around the same time as managers rated their

employees, the participants of the training modules were surveyed online regarding their

opportunities to use evidence-based practices in their work roles.

In addition to the quantitative data collection, several steps were taken to collect

qualitative data from participants during the post-experimental stage of the study. First, I

conducted semi-structured interviews (see Appendix H) at least one month after the training to

learn about how participants apply their competence, and the facilitators and barriers they

encounter in implementing these practices. In addition, over one month following completion of

training, I also coordinated with managers and employees to attend a cross-section of

organizational meetings (see Appendix I). Data collection commenced until a level of

informational redundancy was achieved, and no new themes or insights emerged (Lincoln &

Guba, 1985; Strauss & Corbin, 1994). I acted as a non-participating observer and took written

notes of the session and relevant details as well as recording audio from the sessions for later

transcription and analysis. Meeting agendas were requested to collect information on meeting

purpose, meeting content, and attendance.

CHAPTER THREE: Results of the Study

The amount of missing data ranged from 7.0-39.5 percent across the variables in this study (see Table 3). Much of that missing data was the result of completely random mechanisms (i.e., MCAR). For instance, I erred in sending the wrong version of the Adapted FRESNO test to three participants. For these three participants, some of the items were not present in the incorrect version and therefore required estimation for the relevant analyses. The pre-training evidence-based practice scores that are missing resulted from one manager who was unable to complete them promptly, which should have no association with any variables involved in the analyses for this study. A substantial amount of the opportunity to use learning and post-training evidence-based practice use scores were not collected because of employees leaving the organization shortly after training and eliminating the possibility of assessing them on these metrics.

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Because of the limited size of the sample, many of the advanced techniques for dealing with missing data (e.g., multiple imputations) were not appropriate for these analyses. Therefore, to address the small sample size and corresponding power, I tested each hypothesis as a directional hypothesis given that the relationships were hypothesized as operating in one direction. Under these conditions, Cho and Abe (2013) suggest that alpha levels can be halved to reflect this directionally and that this approach is often underused. In addition to this, a more liberal alpha level was used here to accommodate the smaller sample, given that making a Type I error is not a major concern for the hypotheses involved. I made this determination after considering that the consequences for finding relationships amongst these study variables when

one might not exist would not directly affect outcomes of greater societal significance (e.g., medical decisions for serious health issues).

Given the small sample sizes, separate power analyses for each hypothesis were conducted to ensure the study could capably assess each question. A power analysis using the G*Power computer application (Version 3.1.9.2; Faul, Erdfelder, Buchner, & Lang, 2013) estimated that the study sample size of 27 total participants would be adequate for achieving recommended power of .80 (see Murphy, Myor, & Wolach, 2014) at an alpha level of .10 to detect a moderately large effect ($f^2 \geq .41$) for hypothesis 1. The sample size of 26 was estimated to achieve a power of .80 at an alpha level of .10 to detect a moderately large effect ($f^2 \geq .25$) for hypothesis 2. The sample size of 31 was estimated to achieve a power of .80 at an alpha level of .10 to detect a large effect ($f^2 \geq .21$) for hypothesis 3. Finally, the sample size of 20 was estimated to achieve a power of .80 at an alpha level of .10 to detect a large effect ($f^2 \geq .33$) for hypothesis 4.

Finally, I conducted an analysis of any cohort effects. The mean scores for post-training performance between cohorts did not exhibit a statistically significant difference at an alpha level of .05. In addition, the cohorts did not exhibit a statistically significant difference at an alpha level of .05 on the following variables: attitudes towards evidence-based practice, pre-training competence scores, pre-training ratings of evidence use, and critical thinking disposition scores.

Data Screening

I screened the data for univariate and multivariate outliers. For univariate outliers, I examined the z-score distributions to check for values above 3.3, which is indicative of a univariate outlier (see Tabachnick & Fidell, 2007). All values for each variable were well below this threshold. In addition, histograms for each analysis variable were examined and reflected

normally distributed variables. I divided the skewness and kurtosis scores by their respective

standard errors to obtain z-scores that could be measured against the 3.3 threshold (see Table 4).

None of the variables exhibited skewness or kurtosis anywhere near 3.3. For multivariate

outliers, Mahalanobis' distance was calculated for each set of variables and compared to a critical

chi-square value (i.e., critical alpha level of .001) based on the relevant degrees of freedom (see

Tabachnick & Fidell, 2007). The results indicated that all Mahalanobis' distance values were

below the threshold for multivariate outliers. Finally, to test for equality of variances for

hypothesis number 1 involving group comparisons, Levene's test was utilized. I did not find a

statistically significant difference at the alpha level of .05 for the two groups. Hence the

assumption of homogeneity of variances is made for this analysis.

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Descriptive Results

Tables 5 & 6 illustrate the various attitudes and patterns of evidence use for the

respondents. To put these findings in perspective, I draw comparisons to a large cross-cultural

study of 3,022 managers who were asked many of the same questions as in this study (Barends et

al., 2017). All members were familiar with research databases, whereas a large percentage of

participants seemed to favor one or two databases (62.5%; most often PsycInfo) and most of

them (70.8%) used databases at least five times over 3-4 months. Contrast this with the fact that

only 37% of managers were familiar with online research databases, and 55.8% had never

accessed them over the preceding year (Barends et al., 2017). These findings suggest that the

sample for this study is much more familiar with the research evidence than the typical manager

or organizational practitioner.

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Virtually everyone (95.9%) had a positive attitude towards evidence-based management when presented with a formal definition, compared to 69% of the comparison sample. Even systematic reviews conducted in the areas of healthcare and medicine tend to report in the range of 50-70% of individuals with a favorable attitude towards evidence-based practice (Van Dijk, Hooft, & Wieringa-de Waard, 2010; Zwolsman te Pas, Hooft, Wieringa-de Waard, & van Dijk, 2012). In general, the attitudes of the sample were more favorable to evidence-based practice than the typical manager (see Tables 5 & 6). For example, 91.6% of the current sample agreed that evidence-based practices could improve the quality of a practitioner's work, whereas only 73% of the managerial sample agreed (Barends et al., 2017). The findings for this group of employees seems to bolster the claim that this organization has a supportive climate towards evidence-based practice.

Hypotheses Testing

In this section, I expand on the quantitative hypotheses detailed in the introduction and provide detail on both the analysis steps and the results. Table 7 displays all four hypotheses and posthoc analysis, the measures used for each analysis, the statistical analysis, and the results from each analysis.

Evidence-based practice competence. For H1 regarding the impact of evidence-based training on competence, I conducted a comparison of mean scores on the level of evidence-based practice competence (dependent variable) for the training and non-training groups (independent variable) through an analysis of covariance (ANCOVA). The critical thinking disposition score was used as a continuous covariate in the analysis to control for the impact of pre-training

dispositional factors on training outcomes as illustrated in Table 8. The findings revealed a significant mean difference after controlling for critical thinking dispositions between those who received the training ($M = 87.11$, $SD = 15.21$) and those who did not ($M = 63.11$, $SD = 23.60$), $F(1, 27) = 9.21$, $p = .006$, $\eta2 = .28$. Therefore, hypothesis 1 is supported.

------------- INSERT TABLE 8 ABOUT HERE -------------

Evidence-based practice use. For H2 regarding how evidence-based competence impacts using that competence on the job, I ran a hierarchical regression to assess the positive association between evidence-based practice competence and use of evidence-based practice on the job. As illustrated in Table 9, the overall critical thinking disposition score and experimental condition were added as control variables to assess the impact of evidence-based practice competence independent of dispositional or training effects on work behaviors. Step two placed evidence-based practice competence scores as an independent variable predicting the use of evidence-based practice on the job as a dependent variable. Competence in evidence-based practice was not a significant predictor of using evidence-based practices on the job, $B = -.01$, $t(1, 16) = -.94$, $p = .36$. Therefore, hypothesis 2 is not supported.

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Critical thinking dispositions. For the third hypothesis regarding the positive association between critical thinking dispositions and evidence-based practice use (H3), I used a hierarchical regression analysis to determine the extent to which critical thinking dispositions in participants predicts their use of evidence-based practice on the job, independent of targeted skills training. Critical thinking disposition scores were entered as the independent variable. The pre-training assessment by managers of employee use of evidence-based practices was used as the dependent variable. The pre-training assessment was used as it was assessed just after

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participants took the CCTDI, but before any potential training effects. Critical thinking dispositions did not significantly predict evidence-based practice performance, $B = .00$, $t(1, 29) = .99$, $p = .33$. Overall, increasing critical thinking dispositions did not influence the use of evidence-based practice on the job, failing to support hypothesis 3.

While critical thinking dispositions were not significantly associated with the on-the-job application of evidence-based practices, I performed a posthoc analysis to assess whether it predicted participant's competence in evidence-based practice. The analysis predicted a positive association between critical thinking dispositions and pre-training evidence-based practice functional competencies, independent of targeted skills training. Critical thinking dispositions were entered as the independent variable, and pre-training evidence-based practice competence was entered as a dependent variable. Critical thinking dispositions significantly predicted evidence-based practice competence, $B = .73$, $t(1, 16) = 2.84$, $p = .01$, 95% CIs [0.19, 1.28]. Critical thinking dispositions also explained a large proportion of variance in evidence-based practice competence, $R^2 = .34$, $F(1, 16) = 8.07$, $p=.01$.

Opportunity to use evidence-based practices. For the fourth hypothesis, I used a regression analysis to test the hypothesized positive association between opportunities to use evidence-based competencies and the use of evidence-based practice on the job (post-training assessment) (H4). Opportunity to use learning scores were entered as the independent variable. Evidence-based practice use was used as the dependent variable. Opportunities to use evidence-based competencies did not predict the use of evidence-based practices on the job, $B = .03$, $t(1, 24) = .21$, $p = .84$. Therefore, hypothesis 4 is not supported.

Qualitative Analysis Results

Analysis steps. The quantitative results reported above provide the impetus for further qualitative exploration to understand the nature of evidence-based practice and evidence use in this setting. Analysis of the qualitative data followed the basic tenets of a grounded theory approach (see Länsisalmi, Peiró, & Kivimäki, 2004), concentrating on understanding phenomenon within their group or organizational context. My analysis focused on how practitioners apply evidence in practice, including the competencies from the evidence-based training sessions, as well as the facilitators or barriers they encounter in doing so. The process unfolded in three major stages: transforming and filtering raw data into usable codes, refining and structuring those codes, and building themes that reflect the underlying data and address the research questions. I describe each of these three steps below.

The raw data collected from the study first had to be coded to capture the most relevant pieces of information and relate them to the purpose of the study. To accomplish this, I read the field observation notes, interview transcripts, and open-ended survey comments from managers line-by-line and coded by making notations with the code names attached to specific words or lines of text. I coded the information with the help of the popular computer-assisted qualitative data analysis software program NVivo. Several coding techniques (see Saldaña, 2012) were used to capture relevant pieces of data and help provide meaning and organization for later analysis. For instance, attribute coding was used to capture elements of the task, roles, and settings in which individuals conducted their work. Structural codes were used to pull together relevant data for the various research questions, such as references to barriers or facilitators in applying evidence-based practice. Descriptive coding was utilized to help build an initial catalog of the many phenomena taking place in context. Finally, process and affective coding approaches (see Saldaña, 2012) were used to capture the process of evidence-based practice and

its associated reactions from individuals in the organization. Initially the coding process generated 67 unique codes.

The next step was to refine the codes into a coherent structure that could be used to build themes from the data. I reviewed and refined the codes through a technique called code mapping (see Saldaña, 2012) for better precision in capturing the data. The focus for the codes was on highlighting relevant information through my unique perspective. The result was a complex code structure that included seven major categories and associated subcategories and codes (see Table 10). The overarching categories included the facilitators and barriers to evidence-based practice, the dynamics of gathering, communicating, and responding to evidence, the context for evidence-based practice, and evidence-based training specific factors. The process for creating the code structure involved reviewing the codes and looking for areas of overlap, divergence, or codes that did not seem relevant to the research questions. This included looking at the coded passages and updating the labels and categories through several analysis cycles until they were organized in a manner that allowed a sense of categorical completeness.

Axial coding, which involves strategically reassembling the data around dominant themes and provides better data organization, was used to expand on the different components of evidence-based practice identified in this context. In particular, the goal of this coding approach is to describe the full variety of properties, dimensions, and conditions that can be seen in the data for a particular concept (Strauss & Corbin, 1998). This approach was favored over other techniques such as quantitative counting approaches to better emphasize all relevant instances of evidence-based practice and help establish the complete picture. Throughout this process, I also recorded thematic notes based on my expertise that would serve as a later aid in drawing thematic conclusions about how evidence-based practices occur in this organization.

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The final step involved examining the coding structure and revising my notes to make explicit the core themes for the data. I accomplished this by reviewing the properties and dimensions from the coding structure as well as the original data to identify the most salient themes. The themes were organized by the final axial coded categories of gathering evidence, communicating information, responding to arguments, and the power of context, as depicted in Figures 3-6.

------------- INSERT FIGURE 3, 4, 5, & 6 ABOUT HERE -------------

Practitioner experiences using evidence-based practices. I evaluated the first research question regarding the experience of practitioners using evidence-based practices on the job in several different ways. First, I asked participants to describe how they applied their training to their work roles as a reflection of how these competencies translate to the job. Second, I also asked practitioners about their behavior as it relates to the use of evidence and evidence-based practices on the job, including individual behavioral patterns as well as influences from the organizational context which affected their actions. This approach allows for painting a broader picture of how various practices impact organizational life, both those recommended in the literature and those that employees develop on their own, as detailed in the rest of this section.

Experiences using evidence-based practice training. Participants mentioned several other training outcomes besides the increase in evidence-based practice functional competencies found above (see Table 11). Examples of other outcomes reported include the following: changing their perspective on research or evidence-based practice, making their work easier, increased personal authority, and sharing the training with others. These training outcomes could signify potential benefits to the organization that extend beyond an individual directly

applying new skills and any associated performance improvements. For example, one

participant mentioned that because of the research-oriented culture within the organization; the

evidence-based training allowed them to present their arguments in such a way that their

colleagues perceived "what I am saying is legit." In another case, a participant discussed how

they taught and helped implement ideas from the training with their coworkers, including "how

to find the meta-analysis" when searching for high-quality evidence.

------------- INSERT TABLE 11 ABOUT HERE -------------

Another pattern amongst participants involved how they framed the training and its

implications for practice. Most respondents immediately recognized the parallels with their

research training at the university, whether they embraced it or not, but had a much harder time

connecting the training to practical applications. For example, the training teaches the step of

drafting a focused question around an issue of practical concern, but many of the participants

referenced using the training to craft "research questions" and described experiences with their

ongoing personal or organizational research. One respondent summed up this point by

remarking that "the research lab is pretty straightforward to apply these concepts, but for the

other labs like assessments, OD and evaluation, since I don't have exposure to that, … I am

actually curious how they could use the training."

Experiences using evidence. As detailed earlier in this paper, practitioners use evidence

regularly in their practice whether they formally train in evidence-based practices or not.

Therefore, this study focused on capturing these experiences to understand how the use of

evidence occurs in an organizational environment. The resulting themes from this analysis

indicate that a combination of individual factors related to gathering, communicating and

responding to evidence as well as contextual factors (e.g., cultural) shaped the evidence use of participants within this context.

Gathering evidence. Applying evidence in practice requires that it be gathered from an external source or recalled from one's own experience. Indeed, this was a critical element in how participants described their experiences with evidence. Participants displayed two different approaches in how they gathered evidence (see Figure 3). First, they described seeking a wide variety of sources for evidence. Often, they mentioned research as a primary starting place, but very few elaborated on how they go about this process unless they were explicitly referencing the training search strategies. Second, participants also reported indirectly consuming evidence by relying on others in the organization as evidence intermediaries for a variety of reasons. The following section expands on these two findings.

Participants reported many different sources of evidence (Table 12). For instance, they sometimes generated their evidence through pilot testing efforts that included surveys, observations, or interviews. In many cases, these instruments were created by the individuals using them, reflecting the extent of their preexisting research competence. Participants also often consulted research evidence from the academic literature. Many people described mixing evidence or checking with multiple sources when attempting to gather evidence. For example, one participant detailed a linear process whereby they "very strongly look towards the academic evidence to sort of guide me as much as I can" and "if that doesn't exist, then I start asking people that I know who have dealt with it before, or who have some expertise in the area." Several people relied on this pattern of reviewing the research and then defaulting to their personal experience or the expertise of others as necessary. Another participant observed that when consulting the research literature, people commonly "searched to cite" or "read the abstract

or conclusion to support their argument," suggesting a less than impartial search process. Finally, coworker feedback was used extensively within meetings, generally by an individual making a general inquiry to the group. Interestingly, people infrequently, if at all, checked to verify whether the feedback stemmed from true expertise in an area or just the opinion of the person. In some cases, these opinions were backed by rational arguments, but rarely were they observed to be accompanied by research evidence.

-------------- INSERT TABLE 12 ABOUT HERE --------------

I also observed that individuals used their colleagues as sources of evidence beyond that of listening to their perspectives or experience. For instance, one participant remarked that their employees tend to "ask me directly versus spending hours trying to figure it out" when referring to sorting through the literature to inform an action or decision. Participants also seemed to rely more on their managers to provide them this kind of information. Another interesting phenomenon observed in the data is the case of individuals relying on themselves as experts to inform their actions. Under these circumstances, many of the individuals were knowledgeable about the topics they were acting upon, so they relied upon their recollection of the literature, bypassing a more thorough and current search of the evidence.

Communicating information. The actual use of claims and evidence unfolded in a much more haphazard fashion than suggested by the literature (see Table 13). Participants used terminology relevant to evidence-based practice in inconsistent ways and described using many different forms of evidence without a consistent structure for presenting that evidence (see Figure 4). The following section elaborates on these observations.

-------------- INSERT TABLE 13 ABOUT HERE --------------

The lexicon around evidence-based practice required a substantial amount of defining to facilitate any discussion on the topic. Terms such as 'evidence' and 'research' proved particularly problematic because participants often used them without elaborating on their different underlying meanings. This pattern of responding became apparent as early as the data collection process as several participants instinctively called to mind research examples when responding to questions about the use of 'evidence' in their work. Several respondents required hearing other examples of evidence to make the connection that other types counted as acceptable answers. These patterns were echoed in the actions of individuals during organizational meetings. Hence, many individuals seem to make implicit distinctions between 'evidence' and concepts such as personal experience or intuition unless prompted otherwise. To make the dynamic even more complicated, on several occasions individuals used the term 'evidence' to refer to other types of evidence without elaboration. For instance, one respondent mentioned that "using evidence is definitely considered best practice and definitely encouraged" without clarifying if they had a specific type of evidence in mind or if they meant to reference evidence broadly. This type of response pattern was commonplace in both the interviews as well as the observed meetings.

The use of the term 'research' also caused a lot of confusion for participants despite their research backgrounds. Often they used the term as a verb to refer to any informal process of gathering information as well as using it as a noun to refer to the product of a more rigorous exploration of a question or topic. A related observation is that rarely do individuals elaborate on research references, instead opting for an ambiguous presentation of the term. A handful of participants illustrated this sentiment when they mentioned that claims and evidence are often not questioned, something I also noted consistently in observing meeting interactions.

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Although the language of evidence and evidence-based practice was abundant in this context, the actual demonstration of critical thinking abilities to search for, evaluate, and integrate evidence into decision making was much less common when communicating information. There were few instances of people elaborating on their search or evaluation processes during meetings, and many of the accounts from participant interviews noted similar observations. Furthermore, participants shared many of my observations as they were remarkably aware of the issues, but felt compelled to go along with these organizational conventions. As one participant stated, there is a "social contract" amongst employees that reinforces these patterns of behavior for all but the most critical.

Beyond the complexities of the terminology usage, participants in the study utilized or observed others utilizing many different forms of evidence to bolster their claims. One individual mentioned the importance of research as the underlying form of evidence for making decisions but supplementing that with "a compelling argument for why anyone should care." Individuals also reported utilizing a lot of locally collected data, perhaps a byproduct of having the research training to be able to collect systematic data. Interestingly, individuals tended to elaborate more on internal data collected themselves than for research evidence from the academic literature. Several people reported integrating personal experience into the conversation, often to add context to the discussion. For example, one individual described a personal story of coaching a leader in China, and how that experience conflicted with a piece of coaching research with which they were familiar. Ultimately, they used their experience to try and illustrate the boundary conditions for applying the information from the study to a specific coaching dilemma.

Finally, the structure for presenting information to others varied both within and across individuals. For instance, I observed that sometimes participants would present evidence before making a claim. Other times claims would be presented without any explicit evidentiary support at all. During interviews, respondents focused mostly on external cues when explaining how they made decisions about presenting information. They referenced several types of external factors including group or organizational norms, leader expectations, and role characteristics. Rarely did anyone mention any consistent internal process for how to connect claims and evidence beyond the limited scope of prior research methods training and the skillset of describing data. Many respondents seemed to be perpetually aware of the demands of the external environment and changed their behavior accordingly.

Responding to arguments. Participants in the study processed the evidentiary information they heard in several different ways (see Figure 5 & Table 14). Their responses often focused on peripheral factors that were not specific to the actual communicated message. For example, several participants mentioned that pre-existing evidence preferences played a role in evaluating information as well as encouraging demand for certain types of evidence. Others focused on the reputation of the person communicating the information, mentioning factors such as seniority and perceived expertise as key criteria in encouraging acceptance of information. Some participants emphasized where the evidence comes from or the process for using the evidence, although these comments were often in the context of research evidence. For instance, one participant mentioned that "every time two people talk about research, people care where those resources come from." Participants would also provide their evidence with or without reacting to the original evidence, often in the context of comparing personal experiences with a topic of interest. Finally, some individuals described how team expectations shape how they evaluate

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evidence. For example, in the research department, several people implied there was a norm around scrutinizing the source and process of gathering research as well as the actual findings.

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When participants indicated an evaluation of the actual evidence content, they focused on several different aspects of the message. Sometimes they expressed their interest or gave their reactions to what they heard. For instance, one individual expressed surprise at internal information about problems recruiting and filling roles for what they perceived to be a popular department. Others examined the implications of the evidence being discussed, though this seemed to be cued at least in part from a recurring group process built into the agenda of the meetings. Respondents also indicated various levels of directly scrutinizing the information. The lightest level appeared in the form of the reactions mentioned above as well as dichotomous summative statements about whether people responded favorably or not to evidence presented to them (e.g., "the whole group all thought it was interesting from her …, no one was dismissing it). Others went slightly further by referencing the need to assess the quality of the information they evaluate, without identifying specifics. The highest level of scrutiny mentioned involved digging into the research design and relevance of the evidence and drawing comparisons with other forms of evidence. The combination of environmental cues (e.g., group norms) and participants identifying strongly with their research backgrounds appeared to drive this deeper critical analysis. Finally, the most commonly observed response was to say nothing at all, which seemed to be perfectly acceptable to the group in most situations.

The power of context. The final theme addressing how practitioners use evidence and evidence-based practices in their work roles comes from the influence of the organizational context. Meeting observations and participant interviews suggested that expectations within

settings based on cultural norms and role expectations played a major part in their evidence use or ability to apply evidence-based competencies (see Figure 6). Further, leaders often called attention to these norms and facilitated their effects along with having their direct influence on organizational behaviors. Finally, several task and role characteristics such as the importance of the task and the responsibility level of the role affected the types of evidence-based behaviors adopted. These observations are described further below.

One clear theme across most of the conversations with participants is the salient focus on evidence-based practice as a part of the culture of the organization. As one participant noted, *"if you go to the website, the first thing you see is evidence-based practices in leadership development, so it is part of the identity, it is part of who we are."* Another participant mentioned that people in the organization are "constantly stressing evidence-based - it is part of the culture to be constantly stressing evidence-based, it is there in the name, and we talk about it all the time." Hence, all the data point to culture influencing the use of evidence for this organization. The influence of culture occurred at both the organizational level as well as within the individual departments of the organization. Regarding the organizational influence, virtually everyone in the organization described a feeling that the overall organization promoted applying evidence-based practices. This feeling is developed in employees through onboarding experiences and is "very actively talked about" at organizational and team meetings. One participant stated, "I think I just hear it so much and see it so much, and am surrounded by people who emphasize it" in explaining how the organizational culture transmitted the importance of an evidence-based approach to them.

The influence of leadership stood out as another particularly salient driver of evidence-based practice and reinforcer of an evidence-based culture. Respondents often referenced

leaders in this organization as the ones who first communicated the message about the importance of basing actions on evidence and repeated that message the most. As discussed below, leader expectations acted as a key facilitator of evidence-based practice by participants. On the other hand, there was also some indication that even well-intentioned leadership could inhibit evidence-based practice at the individual level. For instance, one participant commented on how they relied on a particular leader in the organization to evaluate the evidence for them as a shortcut to going through the process themselves. In this case, the leader is still reinforcing discussion about the importance of evidence, but they are modeling practices that conflict with the model used for the evidence-based practice training.

At the department level, there seemed to be two different culture-induced modes of operating within the organization that impact the nature of evidence-based practice: research-focused and practice-focused. Specifically, all but one of the departments focused on practice-oriented functions, and hence exhibited noticeably different patterns of evidence use. These departments focused on internal functions such as human resources management or offering external services (e.g., coaching) for clients. Regarding evidence-based practice, this distinction is critical because individuals operating in practice mode rarely referenced research evidence. These teams recognized and emphasized the importance of 'evidence' in their meetings, but also utilized many other forms of evidence. For instance, coaches would often refer to their experiences in coaching practice to make their point to team members. Several of the internally serving departments referenced the use of surveys and interviews to collect internal data on topics such as employee engagement and workforce planning to inform future decision making.

Research-focused mode, as implied by the name, was prevalent in the research department of the organization. It refers to explicit discussions about the research process,

designing actual research, or reviewing actual research. As one participant framed it, "I think it was something that's instilled in people in the research lab from day one, something that is important - if you are a member of the research lab you got to think critically about what's out there." Research findings tended to be shared only in environments where it was structured specifically for that purpose. For example, one meeting required participants in the research lab to present their work in a fast-pitch style at a company-wide meeting. This type of environment invokes more critical evaluation of evidence as a normal activity. These evaluation practices mainly took the form of discussing specific research projects that were being conducted by individuals or the organization or the results of completed projects.

The organizational role of individuals played an important part in their use of evidence-based practices. For instance, individuals responsible for leading a project were much more likely to report initiating pilot testing efforts and collecting internal organizational data. Those in lower positions more often reported deferring to others in the organization, particularly leaders, on matters of supporting projects with evidence. They also admitted to not looking at the research literature or applying it to organizational problems as often because the role or task they were assigned to did not call for those steps. For example, one individual referenced that their primary objective was to train coaches, but that if they had more responsibility for coaching-related initiatives they would likely have incorporated research evidence into that process. Another individual offered that individuals often act as "just a support … so there is not much need for them to generate the literature and all that stuff." Finally, one participant mentioned that they noticed "there are also folks making sure, double-checking that everything [the organization] does is backed by evidence, and making sure that we can make a direct tie between that evidence and what we do." The implication here is that evidence-based practices can be

encouraged or discouraged based on role or assignment by the organization and perceived level of autonomy.

Certain types or characteristics of tasks also elicited evidence-based practices. Some participants identified smaller and seemingly less important tasks as not requiring more involved evidence-based practices. For example, one participant mentioned the task of compiling a list of academic conference targets for the upcoming semester as a straightforward task that would not require them to "use the evidence base to inform the decision." On the other hand, strategic level projects (e.g., new product or services development) generally required consulting the research literature or creating research instruments to collect information internally. The point in time in which one gets involved with a task also played a role in how individuals applied evidence. Several participants mentioned getting involved with a project after it had started. Therefore, they did not see the necessity in utilizing evidence-based practices. These individuals viewed this work as an early phase of the project lifecycle, which had previously been completed. One participant suggested that the work is structured this way by stating "the projects are kind of set up for us, especially the first semester when we have to split into groups and do a certain a project … so from there we don't get the chance as much to start from scratch." Thus, the structure of a project seemed to suppress the incorporation of further evidence into a process without explicitly being dictated by a leader or coworker.

Barriers and facilitators of evidence-based practice. Participants reported a variety of barriers and facilitators to the application of the evidence-based training along with the use of evidence generally (see Tables 15 & 16). One of the key findings from the results is that barriers and facilitators often overlapped, and frequently respondents had a difficult time making distinctions between barriers and facilitators during interviews. Hence, the same factors (or

elements of those factors) could both positively and negatively influence evidence-based practice use. The largest barriers and facilitators seemed to be related to cultural or task and role factors, as described previously. For instance, the design of certain tasks and roles seemed to inhibit the application of research evidence. Cultural norms around evidence use were also cited as factors in influencing the reduced research use in practice-oriented teams. These influences seemed to operate unconsciously in meetings and working sessions, but participants could identify their influence upon reflection during interviews. The following section focuses on describing the core factors that act as both barriers and facilitators as well as calling attention to areas where this uniform dimensionality might not hold up.

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Factors acting as barriers and facilitators to evidence-based practice use.

As noted above, the majority of the factors that respondents mentioned in their interviews highlighted facilitators of evidence-based practice use that also acted as barriers. For example, they mentioned the perceived opportunity to apply training and level of group support as factors that both help and hinder using evidence-based practices. Respondents usually derived their perceptions of training application opportunities from other factors in their environment such as experiences in their work roles. Alternatively, group support typically came in the form of behavioral norms that were verbally repeated and could either positively or negatively impact evidence-based practices. For instance, one respondent illustrated how lack of group support discourages these practices by stating that "probably I could use the skills in the lead labs, but if I don't say anything, nobody asks me to use the skills."

Respondents also referenced leader expectations as a major factor in dictating cultural norms and ultimately, certain evidence-based practices. The leader was responsible for setting the tone in each department and modeling certain evidence use and response patterns. Participants reported that leaders would directly state these expectations and repeat them periodically in team settings. However, they described these communications as mostly limited and generic, which matches my observations from team settings. Generally, leaders emphasize the need to support claims with 'evidence,' but rarely describe or demonstrate search strategies or ways of evaluating that evidence. Ultimately leaders played a significant role in both inhibiting or facilitating evidence-based practice through their ability to shape both the dialogue of groups and the characteristics of roles and tasks in the organization.

The nature of the respondent's responsibilities based on their roles or assigned tasks played an integral part in their evidence-based practice behavior. While certain tasks (e.g., tasks that come later in a project's lifecycle) constrained one's ability to apply evidence, others encouraged the use of evidence (e.g., tasks that explicitly call for evidence search). Because everyone involved had pre-existing research training or were beginning that training through the university, many of them drew on that expertise for certain types of tasks. While respondents appeared to benefit from their backgrounds in research, they were much less knowledgeable or experienced in translating their research training to practical tasks. Most of the respondents seemed conditioned to associate the evidence-based practice training with research projects despite the emphasis in training on application to practical matters. Almost all the examples of applying the training mentioned in the interviews focused on existing or potential research projects.

Other factors that respondents mentioned overlapped in their emphasis but were expressed with different labels. For instance, respondents cited relevant previous training as an important facilitator and cited many examples of applying their skills from training, while also mentioning lack of practice with evidence-based practices training and lack of general experience as important barriers. All these factors touched on the background skills and abilities of the respondents and how that enabled or limited them in applying evidence-based practices. The lack of practice related mostly to matters of directly applying skills from training and the relative confidence that could be gained from that, while respondents citing lack of experience focused on general role experience and tenure as a critical factor influencing evidence-based practice use.

Factors specific to barriers or facilitators of evidence-based practice use.

Respondents mentioned a few factors as exclusively barriers to their use of evidence-based practices on the job. First, a couple of respondents focused on the separation between research and practice, and the lack of practical value one can derive from research evidence that does not consider the needs of practitioners. Others mentioned a lack of information offered in particular journal articles as a barrier to being able to evaluate their value for practical application. Finally, the lack of work motivation seemed to play a role for certain respondents. For instance, one individual mentioned that a particular project they were involved with was "not that interesting to me" and thus limited their desire to apply the most effective evidence-based practices to that particular task.

Respondents often referenced time constraints as a problem in trying to gather and use research evidence for practical purposes. They identified these time constraints as both personal (i.e., non-work related) as well as organizational time constraints. For instance, at the

organizational level, one participant mentioned that, "I would push more and ask those questions [about information presented by coworkers], and be a little more in-depth …, but that is not fair to anyone when we have an hour and a half to get through 6 or 7 different agenda items, that each are going to take 10 to 20 minutes." Hence, time constraints operated as a form of implicit group expectation or a structural barrier resulting from established group processes in some instances. Another participant commented that "doing keyword searches …, I don't know what pairings are going to give me what I want, is time-consuming. No one has time for that." The implication is that the value of the time investment is not high enough or that they perceive there is not enough time altogether to apply this skill. This is particularly salient given the limited hours that these individuals generally work which may increase the perceived value of their time.

Only one distinct category emerged as a facilitator but not a barrier in evidence-based practices in this organization. In this case, respondents reported the helpfulness of application aids and specifically mentioned the concept of evidence databases for which workers could consult to optimize the evidence gathering process. The purpose of this type of tool would be to address "people's time constraints" indicating a desire for tools that can address existing barriers in their working environment. In addition, participants also focused on training supports such as refreshers and application reminders that could directly benefit the transfer of training to the workplace.

CHAPTER FOUR: Discussion and Implications

Evidence-based practices hold the potential to help society's most fundamental institutions (e.g., government and private businesses) to more effectively pursue their goals by enabling individuals within those contexts to make better decisions. In this study, I explored some of the major factors that drive evidence-based practice in organizations in the hopes of understanding the implementation of these practices better. The first section details the impact of training on evidence-based practice competence as well as the key predictors of evidence-based practice based on the AMO framework of individual work behaviors (Rousseau & Gunia, 2016) for their impact on workplace activity. How employees use evidence in this organizational context is also discussed to illuminate how these practices unfold in an applied setting. The next section describes the power of contextual factors such as cultural, role, and task constraints as well as other significant factors in evidence use applications. I also discuss the barriers and facilitators to evidence-based practice and compare them to previous findings. Finally, I offer limitations of the current study, ideas for future research, and practical implications for consideration to help guide future work on the topic.

Predictors of Evidence-Based Practice

Organizational members around the world must regularly act to make decisions while applying evidence to aid them or their organizations. Hence, the current study examined some of the suspected predictors of high-quality evidence-based practice on the job and how that process might look in an environment that expects individuals to apply research evidence regularly. In line with the AMO framework (Rousseau & Gunia, 2016), the major individual determinants of evidence-based practice were predicted to come from participant's competence in evidence-

based practice, disposition for applying their critical thinking capabilities, and perception of the opportunities available to them to apply their abilities. I also discuss the impact of training individuals in evidence-based practices and its role in fostering competence. Ultimately, none of these factors were predictive of evidence-based practice in this context. The following section describes these findings and potential explanations.

Evidence-based practice competence. Practitioners must be competent in evidence-based practices to reliably apply those competencies to their work roles. As mentioned before, evidence-based practice includes several different steps including the ability to formulate a practical question to frame the evidence search, locating high-quality evidence, evaluating the usefulness of the evidence, synthesizing and applying different sources of evidence, and ultimately evaluating the outcome of the process. Individuals must develop these specific competencies over their lifespan. Below, I describe how the training from this study was able to successfully achieve gains in evidence-based practice competence and how that competence level related to application on the job.

Training outcomes. Central to this study is the assessment of the impact of a training project aimed at developing evidence-based practice competence throughout the organization. The corresponding hypotheses and research questions for this study looked at the effectiveness of existing recommendations and practices in management education in influencing key evidence-based practice competencies and their application to practitioner work settings. As noted by Charlier, Brown, and Rynes (2011), 25% of core MBA courses rely on some form of EBMgt education, suggesting that any potential findings would be informative to a substantial segment of existing management education. Because of the prevalence of this type of training in practice, understanding how best to design and deliver the training can help maximize learning

outcomes relevant to evidence-based practice functional competencies and foster better-performing practitioners.

The current study demonstrated that evidence-based practice training could significantly increase the competence of individual practitioners. This finding corresponds with previous work looking at comparable training efforts for topics such as bibliographic search training (see Goodman, Gary, & Wood, 2014) or in other areas such as healthcare administration (see Guo, Farnsworth, & Hermanson, 2016). Another interesting finding is that the training had a large effect on students with pre-existing training in research methods, statistics, and relevant areas of organizational research at a major university. The results from this study support previous work noting graduate student populations often lack the skills covered in this training (e.g., evidence search skills; see Catalano, 2010; Perrett, 2004) and suggest that this type of training addresses a competence gap not necessarily covered in standard university programs. This observation could be due to previous research training providing a strong conceptual background without the applied skills to translate that background to practice. If the training covers novel yet relevant content, then it makes sense that those with prior knowledge would be in better position to learn (Dochy & Alexander, 1995). In the case of a typical practitioner, we might suspect they stand to gain even more from this training but might be slower to achieve competence gains given that they usually lack any relevant research training. Hence, the use of this type of training in educational programs such as those cited above within university settings could be expected to yield improvements in developmental outcomes.

While the training had an impact on participants even with prior backgrounds in research, their qualitative self-assessments of their learning often suggested that they were skeptical of these gains. Some of the respondents indicated during interviews that the training was less

impactful for them because of its overlap with their prior training at the university. In terms of learning outcomes, these comments conflict with the finding from the experimental training intervention that participants did, in fact, make significant learning advances after taking the training. However, given that previous research (Sitzmann, Ely, Brown, & Bauer, 2010) suggests only a moderate connection between trainees self-assessments of their learning and cognitive learning outcomes (e.g., gaining new knowledge), these comments most likely reflect affective outcomes such as motivation and satisfaction with the experience. If respondents report assessments of their reactions to the experience in place of the competencies measured in this study, that could explain the discrepancy in the qualitative and quantitative findings. Furthermore, these perceptions of the training experience insofar as they reflect issues of motivation can also limit training transfer (see Blume, Ford, Baldwin, & Huang, 2010) as discussed in the next section.

Although typical training applications focus on direct learning outcomes and future application, several participants focused their qualitative feedback from the interviews on other outcomes associated with the training. These individuals identified transmitting practices to others, changes in attitudes towards evidence-based practice, and boosts to perceptions of personal authority as results they experienced from the training. Though not necessarily the norm, these examples provide illustrations of the importance of understanding the social nature of evidence-based practice and alternative ways in which these ideas can diffuse into an organization. For instance, individuals who spread evidence-based practices and adopt more positive attitudes towards those practices can help encourage others to develop and apply these competencies in their work. In the case of individuals who reported teaching others how to use these practices, that process can be viewed both as a means of reinforcing individual learning and

a way in which they signal their support of these organizational practices. In addition, increasing positive attitudes increases an individual's intention to apply evidence-based practices and can help encourage the development of an evidence-based practice culture (Guo, Berkshire, Fulton, & Hermanson, 2018). As discussed throughout this section, individuals rely heavily on these organizational cues from their coworkers, and especially leaders, in deciding whether to use evidence-based practice competencies.

Use of evidence-based practice competence. In this setting, there was no association between the level of evidence-based competence and how managers evaluated the evidence-based practice performance of their employees. Given that these evidence-based practices are supposed to build on critical thinking competencies that are theoretically under development throughout their lives (see Rousseau & Gunia, 2016), this is a surprising finding. On the other hand, this finding also fits with the longstanding observation that transferring skills from the classroom to the workplace is an unlikely outcome of any training program based on their track record (Detterman, 1993; Haskell, 2000; Marini & Genereux, 1995). Given that transfer of learning represents arguably the most fundamentally desirable outcome from education (Marini & Genereux, 1995), these observations may reflect a major limitation in the current educational system to promote evidence-based practices in organizational contexts. Insights from the participant interviews and researcher observations are used below to help make sense of the factors that potentially played a role in the lack of transfer.

The participant interviews and researcher observations seemed to confirm the lack of quantitative transfer effect as participants mentioned very few instances of attempting to apply the training, and rarely referenced examples of using the training in practice. Contrary to the comments about learning outcomes, these comments did coincide with a lack of observed

transfer of evidence-based practices to this workplace. Given that previous researchers have linked intention to use evidence-based practices with that individual's attitudes about the topic (Guo, Berkshire, Fulton, & Hermanson, 2017), it is reasonable to think this connection could act as a barrier to workplace transfer. Alternatively, respondents from the individual interviews made it clear that they do use these practices in their outside work, suggesting that they are capable and willing to use them under the correct circumstances. As discussed later in this section, external organizational factors such as role and task constraints appeared to play a critical part in when and how individuals applied evidence-based practices. If otherwise capable and motivated individuals cannot apply these practices in their organizations, then evidence-based practice training alone might not be enough to lead to improved organizational outcomes.

The nature of evidence-based practices as fundamentally adaptive behaviors might have also made them more difficult to transfer to practice. For instance, previous research on training transfer has found that training open skills, defined as skills that need adaptation to function across a range of applied settings, is more prone to the effects of environmental constraints (e.g., reward systems) on transfer (Blume et al., 2010). While the evidence-based practice steps vary in their place on a continuum of open versus closed, all of them have at least some degree of open characteristics, given they fundamentally rely on non-static foundational critical thinking competencies. Hence, the nature of the competencies necessary for effective evidence-based practice might inherently require additional help to create an environment that supports application of these practices.

The training did not seem to help individuals draw connections with practical situations they faced in the organization, potentially reducing their ability to apply the training to work tasks. As noted earlier, participants generally had at least some level of graduate training in

research and statistics in an academic environment. However, they acquired these capabilities and knowledge in fundamentally different setting than an applied work context. Researchers refer to trainee attempts to take their learning from training in one context and apply it in a much different context as a form of far transfer (Barnett & Ceci, 2002). Unfortunately, the accumulating evidence for this type of transfer is underwhelming. Therefore, if participants were connecting their training to their prior knowledge which is typical of the learning process when relevant prior knowledge exists (see Dochy & Alexander, 1995), that could undermine their ability to transfer their learning. Hence, a strong formal research background might, in some ways, act as an inhibitor to applying evidence-based practices by limiting one's ability to make associations between research and organizational activities.

Another potential explanation for the lack of transfer effects is that participants might already be operating at a high level of evidence-based practice performance given their research backgrounds and the supportive culture. If that were the case, it could attenuate the range for assessing a relationship with competence. However, the average pre-performance score fell only slightly above the middle of the scale (3.66 out of 5), with the scores distributed normally around that average. There are few existing comparison organizational data, but Jepsen and Rousseau (2016) found the same mean score (3.66) with their population of 274 workers across 18 residential aged care facilities in Australia. Interestingly, that population differed drastically from the current study, with nearly half the participants comprised of care staff or nurses and only 15% reporting a bachelor's degree or higher. Catalano (2013) also found that graduate students tend not to use the advanced search strategies or BOOLEAN operators and prefer search expediency over an effective retrieval and appraisal process. This result suggests that the graduate student sample used here was unlikely to be performing ideal evidence-based practices

before the training and is perhaps operating at a similar level to practitioners lacking their research backgrounds.

Critical thinking dispositions. If there is a disconnect between performance capabilities and actual performance on the job, it is reasonable to look towards factors affecting long-term motivational factors such as dispositions. However, in this case, neither the quantitative nor qualitative data point to any critical thinking dispositional factors driving evidence-based practices. Specifically, critical thinking dispositions did not predict evidence-based competence application on the job. Based on a follow-up analysis, critical thinking dispositions did have a large effect on evidence-based practice competence, implying that general critical thinking abilities could be driving evidence-based practice development. As mentioned earlier, participants also reported using evidence-based practices in their personal projects, indicating that they have the competencies and are motivated to apply them. Therefore, the fact that I did not find them applying these practices regularly on the job points to other external factors suppressing both evidence-based competence and critical thinking dispositions from influencing observable organizational behavior.

Opportunity to apply evidence-based practices. Several participants mentioned or implied through the qualitative interviews that opportunity was a factor in their lack of use of evidence for their work responsibilities. However, the quantitative 'opportunity to use learning' measure used in this study was not found to be predictive of evidence-based practice performance. Examining the items from the 'opportunity to use learning' measure reveals that they focus on workload and organizational support factors that differ from the problems identified in the interviews. For instance, participants frequently mentioned a lack of need for evidence in their role or that others had already completed the work requiring consultation with

the evidence before their involvement. Looking at the other scales of the LTSI (see

Katsioloudes, 2015), none of them appear to address these types of structural barriers to transfer

directly. Hence, when the definition of 'opportunity' expands to include these other factors, it

appears that opportunity may still play an important role in encouraging or inhibiting evidence-

based practice.

On the other hand, other studies consistently cite time pressures (e.g., Barends et al.,

2017) as a factor limiting opportunities to use and were mentioned by participants in this study as

well. The fact that time pressures as reflected in the LTSI scale were not predictive of evidence-

based practice suggests that this often-reported barrier may not be as impactful as typically

thought. For instance, individuals may identify time constraints as salient issues simply because

it is a socially acceptable reason to offer even if the consequences for practice are minimal.

Given that managers rated the actual evidence-based practice use, in this case, they would not be

subject to the same perceptions. Another possibility is that a lack of relevance of the other issues

referenced for the LTSI scale masked or attenuated any time effect, muddling the true

relationship. Ultimately, given the lack of observed training transfer and verbal confirmation

from respondents that opportunities played a limiting role, it is likely a factor that plays an

important role and deserves further exploration.

Evidence Use in Practice

Evidence-based practices as taught in the training from this study reflect a best-case

scenario for incorporating the best available evidence into organizational decision making and

action. Without such formal training, practitioners must still use evidence to perform in their

roles, even if in a less than ideal manner. As noted by Rynes and Bartunek (2017), we know

very little about what this process looks like outside the traditional evidence-based practice focus

areas (e.g., medicine). This study utilized observations and practitioner interviews to paint a broad picture of how practitioners apply evidence in their work contexts, the nuances of the process, and how it sometimes departs from typical portrayals in the literature. The results suggest that practitioners often deploy inconsistent patterns of evidence gathering, communication of information, and responding to the use of evidence from others in their organizational activities.

Gathering evidence. Individuals in this organization often considered themselves experts on a topic and hence relied on their expertise to advise their evidence search approach. This observation was particularly true when they had relevant previous experience or training. However, it prompts the question of how often an expert should be consulting the literature to update their knowledge, and to what degree one needs to understand the material to be able to best relate it to a specific decision or context? Building on the idea that all knowledge is fallible (see Powell, 2000), it seems reasonable that even experts should be consulting the evidence on topics they know well to make sure they are up to date on the latest understanding. To the extent that individuals identify themselves as experts in a topic and believe they already understand certain organizational issues, they may also perceive that further evidence search is unnecessary and therefore fail to learn about and apply newly relevant information. In this case the demands of the culture to provide some evidence (i.e., for legitimizing decision making or action) could also result in an impartial evaluation of the evidence due to confirmation bias (see Nickerson, 1998) by encouraging them to only pursue evidence that confirms their perceived expertise. The implication is that cognitive shortcuts and issues of expediency can dictate evidence-based practices.

Participants also utilized their colleagues as conveyors and filters for relevant information to apply to their work roles. Many scholars believe this type of behavior is a necessary feature of scientific expertise (Gaon & Norris, 2001). However, most conceptions of evidence-based practice do not adequately address how dyads, groups, or other levels of interpersonal interactions should share and jointly apply evidence to meet common goals. Given that organizations are complex systems, it is unreasonable to think that individuals even with the highest level of educational attainment in a relevant degree (e.g., organizational behavior) would be expert in all areas of organizational functioning. Hence, some level of reliance on others is necessary. Indeed, it appears that this is the case for many individuals in this context as they often referenced the expertise of their colleagues on a topic as giving them credibility. Frequently participants bestowed expert power to their leaders (see Yukl, 2010) by deferring to them for information and guidance. Specifically, individuals seemed to default to thinking of leaders as experts on a project or topic which in turn increased the leader's influence on decision-making processes. Part of this effect may be explained by the shorter tenure of employees in the organization which leaves them with less knowledge of organizational functioning, hence increasing the value of a longer-tenured manager. The following section addresses how individuals attempt to express these practices and associated evidence in organizational settings.

Communicating information. One of the most illuminating findings from the entire study involves how individuals communicate evidence and how coworkers process those communications. EBMgt scholars rarely define the term evidence even though many different conceptualizations in the broader literature base exist (see Hornikx, 2005), suggesting that the concept of evidence may be inherently difficult to understand and specify (Baba & HakemZadeh, 2012; Miller & Safer, 1993). Often scholars describe the nature of argumentation in terms of

individuals presenting claims and then using evidence to support the claims they make. However, as observed in this study, participants do not always communicate information in this explicitly structured approach. One implication for this type of delivery is that it can be difficult to follow and assess arguments from others because sometimes it is not always explicit what evidence, if any, they are communicating. As noted by Hample (1978), the audience may still attempt to fill in implied evidence for themselves even when not explicitly presented. Some participants suggested that the process of filling in implied evidence could be occurring with their coworkers. From the researcher perspective, it was challenging to observe and make sense of the different evidence communication strategies with a full focus on it, so it must be especially difficult for someone not solely focused on that task. The combination of inconsistent presentation of claims and evidence along with the vague use of terminology makes it difficult for others to evaluate the information properly.

There was some indication from the findings in this study that certain types of evidence could help foster more thorough sharing and explanations of evidence. For example, one informative theme involved individuals propensity to elaborate on internally collected data. This behavior could be due to the involvement of the individual in collecting the evidence and the acknowledgment that no one else is likely privy to the information, thus requiring an explanation. When individuals create the data collection instruments, collect the data, and analyze the results, they generally understand the methods and results in a much deeper way than if they read a research paper conducted by others. As a result, their involvement in collecting the information likely increases information asymmetry relative to others not participating in the process which can yield the type of expert power discussed above. To maintain this expert power, individuals must continuously demonstrate the value of their expertise (Yukl, 2010)

which can occur by providing this novel information to others in the organization. Furthermore, some non-managers bestowed with a certain level of automatic authority might feel compelled to utilize organizational data as a counterbalance to the power of their superiors. Given that previous research found organizational data to be compelling to practitioners when making important decisions (Villanueva, 2011), this may offer a way of fostering more evidence-based practices where appropriate to undertake this kind of effort.

Finally, participants also utilized multiple forms of evidence in their communications to add context to their claims. However, it was unclear how exactly these conclusions were arrived at, making their usefulness difficult to evaluate. The synthesis of information without an objective guiding process can just as easily introduce bias into the process. For instance, the uniqueness paradox (i.e., believing your organizational situation is unique; see Martin, Feldman, Hatch, & Sitkin, 1983) that organizational actors often subscribe to might lead practitioners to justify based on their experience how particular research findings, while having merit, do not apply to their situation. In this way, personal experience, attitudes, and expertise filter other types of evidence and their application to an individual's work role (Kieser, Nicolai, & Seidl, 2015). When practitioners do not or cannot elaborate on their approach to enable others to determine the level of critical thinking being applied to this synthesis step, the value of this evidence mixing strategy becomes questionable.

Responding to arguments. A critical part of understanding evidence-based behavior in organizations involves understanding how individuals respond to the full range of approaches others use to make claims and support those claims with evidence. The most common response by participants to hearing arguments from their coworkers was to say nothing at all or to provide a non-substantive response. Under ideal conditions where practitioners clearly articulate claims

and evidence, this could be considered an appropriate response. However, as described in the

previous section, there were many opportunities for individuals to ask about the supporting

evidence for a claim or make other relevant inquiries in support of the group process. There are

several possible explanations for this kind of response pattern. For instance, participants may

maintain an elevated level of trust in their peers that leads to them simply accepting their word at

face value. This behavior could reflect a deeper inclination for individuals to trust others that

develops very early in our childhood (Jaswal, Croft, Setia, & Cole, 2010). The interview

responses also indicated that participants felt they and their coworkers often accepted

information coming from their peers based solely on factors such as credibility, social norms,

and time constraints. Some of these observations could stem from the earlier mentioned expert

power that some individuals attained, which can ultimately result in increased acceptance of

information from peers (Yukl, 2010). The fact that in most cases coworkers did not inquire

further about the nature of the evidence and how it was gathered or evaluated seemed to

reinforce the less than ideal communication patterns discussed above.

The response patterns also suggest that coworkers are processing information based on

peripheral cues rather than evaluating the true merits of the information (see Petty & Cacioppo,

1986). For example, some participants mentioned factors such as the reputation of the sender or

their pre-existing evidence preferences as integral to how they respond to evidence presented to

them by coworkers. Under these circumstances, respondents pay less attention to the quality of

the evidence and instead tend to accept the mere presence of evidence as adequate to be

persuaded (Perloff, 2017). This type of response also coincides with the observation in the

previous section regarding participants communicating that a claim is supported by evidence

without providing further details. Unfortunately, such an undiscriminating response undermines

the critical evaluation of evidence, a fundamental tenet of evidence-based practice. The lack of scrutiny also likely sends a tacit signal of approval for the information and does not hold the communicator accountable for explaining the evidence and its relevance for the issue at hand. Hence, it is understandable how certain types of less than ideal practices persist, even in an organization with a professed culture of focusing on the evidence. As discussed in the next section, the complexity of organizational cues and demands that shape evidence-based practices could explain a significant portion of these practices.

The power of context. As Larrick (2009) points out, while individual factors play an important role in effective organizational decision making, it is often environmental factors such as the social norms and expectations that heavily influence and teach people ways of performing in organizations. Meeting observations and participant interviews suggested that expectations within settings based on cultural norms and role characteristics played a major part in their evidence use or ability to apply evidence-based competencies.

Cultures of evidence use. Participants described a strong sense of an evidence-based culture that they learned upon entry into the organization, and that is prominently discussed or understood amongst everyone. They mentioned how the onboarding process emphasized supporting everything that happens in the organization with evidence, and how that message is repeated amongst coworkers and reinforced by leaders regularly. Yet participants also indicated directly or indirectly that this cultural effect seemed to operate unevenly and perhaps sometimes in opposition to recommended evidence-based practice protocols. They identified factors such as the subcultural influences on evidence-based practices and leadership as critical components in shaping how culture impacted evidence use in the organization. I discuss the factors influencing evidence-based practices and how they depart from ideal practices below.

The research department environment in this context suggests that making these types of practices highly salient and setting expectations for more critical thinking can increase helpful dialogue around evidence. For instance, some individuals described changing their evidence related behaviors based on their participation in the research lab context relative to their role in other departments. These changes involved referencing more research and a closer examination of the evidence when presented to them. In contrast, the other departments mentioned research evidence infrequently and typically relied on personal experience and rational discussion when discussing how to proceed with certain tasks. These variations across departments referenced by participants suggest that different department level subcultural influences could be shaping behavior beyond that of the organization. As Schein (2010) notes, differentiation into subcultural groups is a natural part of organizations aging and growing whereby the formation of certain functional teams with similar backgrounds is necessary to scale the company. These subgroups adopt elements of the larger culture, but also exhibit unique cultural norms based on common characteristics or purpose. Hence, the cultural influence of any organization on evidence-based practices is likely to reflect a combination of cultural levels specific to that context.

If socialization processes are responsible for introducing these cultural elements to employees, the leaders in the organization seemed the most responsible for reinforcing and shaping the actual implementation of these cultural practices. The importance of leadership is not surprising, given that leadership and culture are often described as being strongly intertwined (see Schein, 2010). As observed in the studied organization, the leader set the tone for the departments and modeled certain evidence-based practices which in turn established the importance and acceptability of behaviors. Further, leader modeling of behavior can teach

application techniques and increase other's self-efficacy (Bandura, 1982) which could have helped encourage the same behavior in employees. Unfortunately, this modeling behavior seemed limited to generic mentions of supporting claims with evidence, but infrequently included discussing or demonstrating search strategies or evaluation of actual evidence. Modeling particular activities such as evidence search approaches proved much harder for groups given these activities are typically executed independently. Any difficulty in demonstrating and modeling evidence-based practices may help explain the disconnect between the emphasis on evidence-based practice and what occurs when individuals work independently on these tasks. The following section further expands on the organizational factors that shape evidence-based practices by describing impactful role and task characteristics identified by participants.

     Role and task constraints on evidence use. The comments from participants in this study suggested a sense that they could not act freely because of the demands of the role or task assigned to them. Rich (1991) suggests that organizational roles, rules, and procedures limit how practitioners search for and use information, and this appeared to play a major part in how evidence-based practices applied in this organization. Specifically, the nature of the role or task constrained many individual's perceptions that they could or should consult the research literature for guidance on a project or task. In addition, the level of importance of the task and the stage at which one gets involved also impacted whether certain evidence-based practices were implemented or even considered in their work.

     One prominent factor in the use of evidence was the extent to which a role was designed to foster evidence-based practices or not. In particular, the job design literature (see job characteristics theory; Hackman & Oldham, 1976) describes several factors that seemed to play a

role in this context. For instance, individuals leading projects were much more likely to initiate data collection efforts. Those in lower positions of authority frequently deferred to others in the organization, often leaders, to collect, disseminate, and apply evidence. These individuals experienced a high level of autonomy by virtue of the role design that corresponds with a core component of effective job design. Hence, certain roles and tasks seemed to imbue a level of positional power (see Yukl, 2010) to individuals that allowed them more latitude to enact evidence-based practices. Unsurprisingly based on the observations mentioned throughout this section, leaders seemed to hold the most expectations for applying evidence in their practices. However, some participants mentioned that certain individuals were responsible specifically for checking evidence on projects, highlighting entire roles designed around evidence-based practices.

Finally, certain characteristics of tasks influenced whether participants thought they could use evidence-based practice tactics. Smaller and less important tasks (e.g., planning a meeting) seemed to call for less evidence-based practices. Further, certain individuals also mentioned the timing of their participation in a project as influential in their use of evidence-based practices. As discussed earlier, there may be a useful purpose behind splitting up the work in this manner. For instance, organizational practitioners do not have infinite time at their disposal, and less important tasks are unlikely to yield a good return on one's time investment, so there must be some level of decision structure and evaluation that occurs (see Yates & Potworowski, 2012). In the case of this organization, the practitioners did not specify a specific process or framework for splitting up the work or the logic behind how tasks were structured. In addition, the job design literature (Hackman & Oldham, 1976) suggests that employees need to experience responsibility for the entirety of a task (i.e., task identity) which in turn can drive job performance (Fried &

Ferris, 1987). This condition was unlikely to be met in circumstances where people are plugged into well-defined pieces of larger projects. To the extent that these structures encourage individuals to not feel the need to apply critical thinking abilities to their job roles, overall organizational performance is likely to be adversely impacted.

Barriers and facilitators of evidence-based practice. The findings from this study illuminated some of the factors that can positively and negatively affect the application of evidence-based practice. Given the disconnect between competence in evidence-based practice resulting from the experimental training and its use on the job, the barriers and facilitators participants identify can provide important insight into the matter. In addition, the advanced research competence for participants in this study presented an opportunity to learn about some of the later stages of the evidence-based practice process that do not occur when practitioners have less experience with or access to research.

The current study used several qualitative measures to uncover a broader range of factors that act as barriers to applying evidence-based practices and frequently supported previous findings. Table 15 illustrates the similarities and differences in barriers reported in formal surveys of practitioners (e.g., Barends et al., 2017) and the findings of this study. The current study almost entirely addresses the following factors referenced earlier from Barends et al., (2017): lack of time, inadequate understanding of scientific research, readability of journals, organizational culture, accessibility, and awareness of research as a resource. Other researchers found a similar set of barriers from a self-report survey of U.S. healthcare administrators (Guo et al., 2018). As expected, previous research emphasizes individual skill deficit factors (e.g., ability to locate research articles) more often, while the current study implicates a broader range of organizational factors. Participants in this study all have access to an extensive array of research

resources while also taking part in a rigorous education in both research and statistical methodology. As noted by Rynes and Bartunek (2017), individuals trained as scientists and practitioners are expected to be ideally suited to practice in an evidence-based manner. The organization is also explicitly supportive of the evidence-based mantra. However, even in this case the transfer was not readily apparent from the data. As discussed below, the nature of the role and task, as well as organizational culture influences, dictated these decisions.

The results confirmed some of the previous research (see Table 15) on reported barriers to evidence-based practice (e.g., Barends et al., 2017) and suggested that many of these factors also act as facilitators. As noted earlier, the issue of time was cited quite often in the administration of this project, suggesting that it is of general concern to many of the participants. The other interesting takeaway relates to some of the comments from participants who mentioned that evidence databases and research skimming strategies could help mitigate their concerns about time constraints, perceived or real. Their feedback suggests an important role for skill-building and tools that help expedite or simplify the process of gathering, interpreting, and synthesizing evidence for practical use, and hints at the demand for practices and resources that have shown promise in other areas of practice (Rousseau & Gunia, 2016). In this case, participants completed some skill-building activities, but additional practice and application opportunities along with relevant tools could help address the other identified barriers.

Cultural factors drove an organization-wide emphasis on evidence, but also seemed to inhibit other more specific types of evidence-based practice behaviors. This finding supports the idea that identifying culture as one uniform construct that acts as a barrier or facilitator is unlikely to capture its true impact on organizations (see Martin, 2002; Potworowski & Green, 2012). In the case of this organization, there was evidence that culture acted not as a uniform

and overarching influence, but as a multilayered and somewhat fragmented set of influences that both reinforced and undermined evidence-based practice. At least one subculture (e.g., the research department) operated by a specific set of expectations that emphasized using research evidence more often, yet their interview responses and researcher observations revealed that this research evidence application did not transfer to practical issues. In this case, the department cultural norm seemed to reinforce a more critical approach to evidence for one specific type of task (i.e., research) and not others. As Potworowski and Green (2012) note, culture can act as a filtering mechanism for which evidence-based practices get adopted and when practitioners apply them to organizational problems. This filtering mechanism seemed to be operating in the organization under study, particularly at the level of teams.

Implications for Practice

The results of this study provide several suggestions for addressing core issues in applying evidence-based practices in organizations. First, given the technical nature of the steps involved in these practices, they are unlikely to naturally occur at a high level in practitioners and therefore need to be cultivated through schooling or organizational training. Hence, educators and trainers should continue to build and enhance development programs that meet the needs of future evidence-based practitioners. Second, where possible training should be localized to help provide context and improve transfer outcomes. Finally, EBMgt should be considered not as simply something practitioners do, but as something that organizations conduct along with their role in supporting individual level practices. I elaborate on these ideas below.

For those designing or delivering development programs aimed at enhancing evidence-based practice competencies, the starting place should be to focus on modeling effective evidence-based practice in their teaching or training. First, they can optimize their approach by

consulting the extensive literature on training and education and getting specific answers to

questions they have about effective implementation and post-training support. Of importance

will be understanding how the local environment for which the learners need to apply evidence-

based practices might help or hinder learning transfer efforts. Furthermore, as with many areas

of organization science, practitioners will not find all the needed answers to their questions

through research evidence. Hence, another important strategy should involve trialing different

adjustments to the foundational principles from research (or elsewhere) and evaluating their

effectiveness. For example, learning professionals could frame these trainings within the context

of making effective decisions, or individual, team and organizational performance (e.g., Yates &

Potworowski, 2012) to avoid issues with the terminology of 'evidence' and 'research.'

Educators could also apply many of the procedures from this study to help understand training

impact and trainee application experiences to develop further improvement ideas. In the case of

this study, I used qualitative interviewing to allow trainees to voice their ideas for improving the

training that could be tested elsewhere (see Table 17). This interactive process of continuously

trialing, collecting formative information, and using that information to improve practitioner

development and skill application can help ensure that evidence-based practices properly fit the

context for which they need to perform.

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Whenever possible, training of evidence-based practices should occur at the local level to

foster the best transfer to the specific context. Teachers administer skill-based development

activities within social and physical contexts that shape their ultimate effectiveness (Ritchhart &

Perkins, 2005; Salomon, 1993) and evidence-based practices are no exception. One possible

implication of this is that teaching complex skills such as critical thinking in one context (e.g.,

MBA program) and expecting them to transfer to another setting (e.g., the workplace) is unrealistic. In addition, teaching individuals to apply these skills to specific problems may be highly effective for those particular problems, but may also preclude the development of the general critical thinking capabilities underlying evidence-based practice. Organizations regularly present novel and complex problems to address, so an evidence-based practitioner would need to exhibit many different types of transfer, including to new contexts as well as similar and dissimilar situations (see Haskell, 2000). A potential compromise for university-based development programs could be Executive MBA programs which allow students to practice what they learn within their work environments amid their time in school. This approach permits for faculty feedback to address concerns with specific implementation issues on the job, assuming they have the competence and time to provide this kind of tailored assistance. However, there is likely no complete substitute for developmental experiences that are tailored to and integrated with the organization to ensure the uptake on these practices in organizational life.

Organizational actors should emphasize the power of the collective to enact evidence-based practices in organizations. As some of the respondents from this study pointed out, interventions could be much more effective when integrated more closely into the organization. One way to support individuals in organizations in using evidence-based practices is to emphasize these practices as a collective process whereby several people across different areas of the organization participate as appropriate for the importance of the task. For instance, job design interventions might help by linking job descriptions together to function interdependently and rewarding individuals for working together to apply the best available evidence to projects or tasks. Naturally, individual information processing and decision making will still play a role in

this process, but it also allows for understanding and optimizing the effects of contextual factors in the organization to support better overall organizational decision making.

Finally, focusing on a nuanced approach to shaping the culture of the organization and its various subcultures can help support the application of the most effective evidence-based practices on the job. As demonstrated in this study, simply holding a collective belief in the underlying importance of an evidence-based approach to organizational action does not necessarily encourage the most effective practices. To address this, organizations can model and label what these practices look like during socialization processes to help their employees understand how to apply them, but also to communicate their importance within the organization. We must also train and reward leaders for demonstrating specific behaviors in front of others, communicating feedback on performance, and linking positive outcomes (e.g., promotions) to the corresponding desired evidence-based practice behaviors. Frameworks such as evaluation capacity building which emphasize supporting evidence use in practice (Preskill & Boyle, 2008) offer a means for building these types of practices into everyday organizational practice. Those in charge of shaping the culture of their organization should also adopt the approach mentioned above of trying different techniques to see what is effective in supporting evidence-based practices and working to institutionalize those practices into the organization.

Study Limitations

As with any research in field settings, there are tradeoffs between the benefits and drawbacks of researching in that environment. For instance, the amount of control over the scheduling of activities and assessments, although considerable from an organizational perspective, was severely lacking compared to a laboratory research setting. That likely resulted in the attenuation of potential results, particularly when examining the causal hypotheses

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proposed in the study. For example, implementing the training in the organization required complying with the schedules of everyone involved, and there was even less consistency in how quickly respondents completed the assessments of evidence-based competence. Therefore, it is possible that significant effects could have been missed simply due to this and other sources of measurement error.

The current study also focused on a single organization with a smaller sample of employees which is less than ideal for quantitative hypotheses with smaller expected effects or the need to tease out certain nuances. However, the statistical power existed to assess the larger sized effects needed to make a difference in organizational functioning. Given the nascent state of the empirical work in the field of EBMgt, I judged this to be an acceptable tradeoff to focus on the larger effects while understanding that the nuances can be discovered over more extensive and specific research. I also selected this setting for its unique and rare representation of scientist-practitioner type employees and its stated emphasis on fostering evidence-based practices. The smaller context enabled a closer look at the question of how this process unfolds in an organizational context and allowed for exposing some of the granular elements of these relationships that others can explore going forward. As Highhouse and Gillespie (2009) note, the role of representative sampling is less important in most applied settings relative to focusing on studying actual manifestations of the phenomenon of interest.

Another limitation of the current research involves the implications for the exploratory nature of the qualitative research questions. As pointed out by Rynes and Bartunek (2017), there is a dire need for more high-quality empirical work to address the question of what works regarding evidence-based practice implementation. Although this approach is appropriate for the state of the research in evidence-based practice, the current study is not expected to provide a lot

of firm answers, particular to matters of cause and effect, on its own. Instead, I expect it to support future research that does provide more concrete answers to questions regarding barriers to practice, ideal transfer strategies for evidence-based training, and how evidence affects different types of organizational performance. In this sense, this study can fill in one piece of the puzzle that supports a larger body of evidence addressing key issues in evidence-based practice implementation.

Finally, the scope of the evidence-based training curriculum assessed in this study could be considered a limitation. The present curriculum focused on material currently used in practice by management trainers and scholars, but existing training from other trainers exclude or only lightly address areas of expressed importance to evidence-based practice (e.g., outcome evaluation). Therefore, a true test for training on the entire range of evidence-based practice does not yet seem possible without a broader range of curriculum to support testing. In addition, Rousseau and Gunia (2016) acknowledge that additional functional competencies might need inclusion in evidence-based training such as skills in managing change processes. On the other hand, this study is better suited to understand the potential impacts of existing evidence-based practice development efforts both at universities as well as organizations. Furthermore, the experience of applying this training and the obstacles that practitioners encounter in doing so could and should inform these additions to the core curriculum. For example, participant interviews and observations detailed the central role of certain evidence-related behaviors (e.g., communicating the evidence to others) in the use of evidence in applied settings. Scholars and educators should address these curriculum deficiencies with future research and test the various training approaches described above to determine the most efficacious approaches.

Implications for Future Research

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This study explored some of the foundational concepts in the area of evidence-based practice and offers a platform for forming a clearer research agenda around the teaching of evidence-based practice and how these practices filter into organizational life. The proposed training resembles the existing evidence-based practice training currently being implemented around the world. However, the variety of approaches to evidence-based training is likely to grow over time which could have implications for how well any observed effects reflect the entire class of stimuli (Highhouse & Gillespie, 2009). Future research should consider testing several manifestations of training with larger samples that allow for more nuanced hypotheses. For example, more comprehensive training approaches might focus on foundational critical thinking development along with the more specific functional capabilities. Other options could include focusing on group or team level training, as suggested by participants in this study.

Scholars have previously called out (see Lord & Maher, 1993; Weiss & Bucuvalas, 1980) the need to understand better how expertise mixes with other forms of evidence within the context of evidence-based practice. For instance, some of the participants in this study referenced how they draw upon the research knowledge that they are aware of, or a blend of their pre-existing knowledge with their experiences and other types of information. This process of synthesizing information and mixing evidence over time is not well understood but seems to underlie a lot of decision making and action in practical contexts. While the traditional EBMgt approach conceives of evidence synthesis as a discrete stage, the current study suggests that evidence synthesis is continually occurring, even outside of formal decision-making situations.

Future work should also focus on examining individuals with the prerequisite evidence-based practice competencies to better understand the full range of barriers involved in driving important organizational outcomes. Based on previous examinations of evidence-based practice

amongst practitioners, we seem to understand very little about its implementation or the ideal

facilitating environments. As Rynes and Bartunek (2017) point out, little formal examination of

techniques for applying evidence and evidence-based practice implementations central to

functioning organizations exist. For instance, given the inherently political nature of evidence-

based decision making in organizations (see Hodgkinson, 2012), how do practitioners navigate

the use of evidence to implement projects that are supported by research evidence but are less

popular locally? Part of this lack of understanding might reflect the reality that few practitioners

are familiar with research evidence, and hence unlikely to have many opportunities to access and

apply it in practice. Further research examining what needs to occur when empowering

practitioners with access to research evidence seems vital to better promote ideal evidence-based

practices in organizational settings.

Another interesting avenue of exploration is to examine how different levels of

practitioners implement evidence-based practices and how they interact across levels. Often the

discussion revolves around managers and their ability to gather, interpret, and apply evidence,

which is one reason why the EBMgt approach has been labeled by critics as managerialist (see

Learmonth & Harding, 2006). However, practitioners at any level of an organization can

practice in this manner and need not be excluded from the discussion. Despite this, managers

clearly have a wider range of latitude in most situations to make decisions of greater

consequence, take on more advanced tasks, and generally hold more power. The current study

examined the practices of individuals at all levels of the organization, but most of the participants

were non-manager specialists or support staff. Many of their comments reflected a lack of

authority or power, so it would be informative to explore some of the differences between

managers and non-managers more thoroughly to see how the demands of their roles impact their

evidence-based practices. Finally, the interaction of these levels should be examined, especially in the context of leaders and their followers and how those dynamics shape evidence-related behavior.

The results of this study indicate the importance of understanding role or task structures in evidence-based practice performance. Hence, an important goal of future research should be to test various types of role and task characteristics to see how they impact different evidence-based practices. As an example, testing different levels of task scope could be important for helping to determine its impact on evidence-based practices. This line of work could also help establish where the tradeoffs exist between expending more effort on evidence-based practices and increasingly smaller or less important tasks so that practitioners more appropriately allocate their time. Researchers could also explore the effects of integrating evidence search, synthesis, application, and evaluation competencies into job descriptions, performance reviews, and other structural job elements. Further, they could also assess how competence in supporting others use of evidence-based practices affects evidence-based practices in organizations. The results of these studies can aid both practitioners trying to apply evidence-based practices within a role or task context along with those designing jobs and projects intent on fostering EBMgt in their organizations.

Finally, scholars should examine evidence-based practice interventions at the group or organizational level, and their impact beyond individual competence building. Existing definitions and frameworks mainly focus on the individual decision as to the core process (e.g., Briner et al., 2009), yet individual decision making in organizational contexts can be quite constrained by forces frequently beyond an individual's control. The current study looked at a training intervention for one small organization, with an emphasis on capturing mainly

individual impacts. Yet feedback from some of the individuals suggested a role for concepts like group training on evidence-based practice competencies as a means of enhancing training transfer.

Conclusion

Scholars often propose training in evidence-based practice as a key strategy for increasing the amount of evidence-based practice in organizations. Outside of areas such as medicine and nursing, we know very little about the effectiveness of training and application of evidence-based competencies to practical organizational contexts. The current study demonstrates through a mix of hypotheses and exploratory research questions how evidence-based practice develops and influences practitioners in a knowledge organization context. Specifically, evidence-based practice training appears to have great potential for fostering more evidence-based practice in organizations. However, the culture of the organization and the design of job roles and tasks also plays a major role in shaping these practices. To truly transform an organization to be more evidence-based, we need to think of these efforts from an organizational development approach aimed at supporting individuals in fully realizing their capabilities as evidence-based practitioners. The hope is that the results from this study will help offer guidance on future research that allows us to pinpoint how to make these transformations a reality in modern organizations.

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Table 1
Demographic Profile of Participants (N=43)

Characteristic	%
Education level	
Bachelor's degree	48.8
Master's degree	51.2
Education background	
Business/management	4.7
Communications	4.7
Economics	4.7
Education	2.3
Evaluation/applied research	2.3
Human resource management	2.3
Organizational dynamics	2.3
Psychology	74.4
Familiarity with databases (N=23)	
1-2	62.5
3-4	33.3
5+	4.2
Use of academic databases in the last 3-4 months (N=23)	
0 times	4.2
1-2 times	16.7
3-4 times	8.3
More than 4 times	70.8
Familiar with evidence-based management concept (N=23)	
Yes	37.5
Somewhat	50.0
No	12.5

Note. Percentages are compiled from the measured responses of the participants. Respondent Mean Age = 28.5 (SD=7.2).

Table 2
Meeting Details

Meeting type	Agenda items	Attendees
Manager's meeting 1	LeAD 2020 - Initiative Updates - Obstacles or challenges Evidence-Based Training - Lab Meeting Dates Report Out/End-of-the-Year Meeting - OD Lab Sponsor: Stephanie - Materials All Labs Meetings Updates - March 30th: GLI Recruitment meeting - April 17th: Research Meeting, Burkle 16, 12-1pm - April Tuesday 25th: Report out on strategic and operational initiatives Upcoming Events - April 17th: Research Meeting, Burkle 16, 12-1pm - April 19th: Lab Leads Meetings	Managers only (4)
70.20.10 developmental team	N/A	Organizational development department manager, associates and interns (5)
Organization wide meeting – Hosted by the research department	Meeting Objectives: 1. Research lab members will practice concisely articulating their research work under a given time constraint. 2. Create an engaging learning opportunity for members of other labs. 3. Further and support LeAD 2020 priority 4H. Meeting Agenda: Noon – 12:05 Welcome, Enter Drawing, and Self-Serve Lunch	Managers, associates, consultants and interns (n/a)

	12:05 – 12:15 Trivia and Prizes 12:15 – 12:40 Rapid Fire Research 12:40 – 12:45 Voting for Best Presentation 12:45 – 12:55 Featured Research Study: Psychological Capital for Leadership Development 12:55 – 1:00 Drawing Winner Announced	
Research department meeting	Follow-up to Organization Wide Meeting Above Presentation by Research Associate on Research Technology Aids	Manager of research department, associates and interns (7)
Member recruitment and growth team	Checking in on the progress of team tasks	Manager of the organizational development department, associates and interns (4)
Manager's meeting 2	LeAD 2020 - Initiative Updates - Obstacles or challenges Evidence-Based Training - Lab Meeting Dates - Continue to let Josh know when meetings are Report Out/End-of-the-Year Meeting - OD Lab Sponsor: Stephanie - Material / Template for representing information - Format - Announcing to Labs Succession Planning - Job Description Updates - Select 1-3 Members for Promotion by 4/21 Upcoming Events - April 25th: Report Out/End-of-the-Year Meeting - TBD: Last Lab Leads Meeting?	Managers only (4)

Organization wide meeting – Hosted by strategic leadership team	Meeting to report progress for every organizational unit. Also spent time acknowledging departing members and their accomplishments.	Managers, associates, consultants and interns

Table 3

Summary of Missingness for Study Variables

Variable	Percent missing	N	Proposed reason for missingness
Critical thinking dispositions	20.9	34	Lack of time in schedule Departed organization (18.6%)
Evidence-based practice functional competence	37.2	27	Departed organization (18.6%) Lack of time in schedule
Opportunity to apply evidence-based practice skills	32.6	29	Lack of training completion Departed organization (18.6%)
Manager perceptions of evidence-based practice (pre-training)	7.0	40	Manager (i.e., rater) not available (7.0%)
Manager perceptions of evidence-based practice (post-training)	39.5	26	Lack of training completion Departed organization (18.6%)

Table 4

Descriptive Statistics of Study Variables

Variable	N	M	SD	Skewness	Kurtosis
Critical Thinking Dispositions	34	313.47	25.64	-.43	.33
Evidence-Based Practice Functional Competence	27	71.11	23.84	-.35	-.80
Opportunity to Apply Evidence-Based Practice Skills	29	3.58	.69	-.18	.58
Manager Perceptions of Evidence-Based Practice (Pre-Training)	40	3.70	.52	-.04	.41
Manager Perceptions of Evidence-Based Practice (Post-Training)	26	3.63	.51	.44	-.18

Table 5

Attitudes Towards Evidence-Based Practice by Percentage

Statement	Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree
Evidence-based practice is not applicable to managers and consultants because their professions are based on hands-on experience and implicit knowledge.	66.7	33.3	0.0	0.0	0.0
Evidence-based management does not do justice to the personal experience and implicit knowledge of managers and consultants.	20.8	62.5	8.3	8.3	0.0
By using evidence-based practices, managers can improve the quality of their work.	4.2	0.0	4.2	33.3	58.3

	Very negative	Somewhat negative	Neither positive or negative	Somewhat positive	Strongly positive
How would you describe your attitude towards evidence-based practice?	0.0	0.0	4.2	41.7	54.2

Note. Percentages are compiled from the measured responses of the participants (N=23).

Table 6

Attitudes Towards the Applicability of Scientific Findings by Percentage

Statement	Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree
Every organization is unique, hence the findings from scientific research are not applicable.	20.8	62.5	16.7	0.0	0.0
The results of scientific research are theoretically sound, but do not work in practice.	25.0	45.8	25.0	4.2	0.0
Scientific research is conducted by researchers who are too far removed from the day-to-day work of a practitioner.	12.5	16.7	37.5	33.3	0.0
Researchers investigate topics that have no practical relevance.	37.5	25.0	25.0	12.5	0.0

Note. Percentages are compiled from the measured responses of the participants (N=23).

Table 7

Hypotheses Chart with Analysis Details

Hypotheses	Analysis	Measures used	Result
H1: Exposure to training in evidence-based practice will lead to increased evidence-based practice functional competence.	Analysis of covariance	Adapted FRESNO Test - EBMgt	Significant, Large effect
H2: Functional competence in evidence-based practice will be positively associated with evidence-based practice use.	Multiple regression	Adapted FRESNO Test - EBMgt Experimental Condition Managers Perception of Use Scale (Post-Training)	Not significant
H3: Critical thinking dispositions will be positively associated with evidence-based practice.	Regression	California Critical Thinking Dispositions Inventory Managers Perception of Use Scale (Pre-Training)	Not significant
H4: Opportunities to apply evidence-based practice skills will be positively associated with evidence-based practice use.	Regression	Opportunity to Use Scale Managers Perception of Use Scale (Post-Training)	Not significant
Post-hoc Analysis: Critical thinking dispositions will be positively associated with evidence-based competence.	Regression	California Critical Thinking Dispositions Inventory Adapted FRESNO Test - EBMgt (pre-training)	Significant, Large effect

Table 8

Analysis of Mean Differences Between Training and Control Groups on Evidence-Based Practice Competence (N=27)

Variables	Mean	*SD*	*F*	*η2*
CCTDI (covariate)	311.81	24.04	2.90	.12
Training Group	87.11	15.21	9.27*	.28*
Control Group	63.11	23.60		

*Statistically significant at *p* = .01. DF = 27.

Table 9

Regression for Evidence-Based Practice Competence Predicting Use of Evidence-Based Practices on the Job (N = 20)

Variables by order of entry	R^2 added	F added	R^2	B	SE_B
Critical thinking disposition					
	.10	.93	.10		
Experimental condition					
Competence in evidence-based practice	.05	.89	.15	-.01	.01

Note. *DF* added for final step (1, 16). Adjusted R^2 for model equals -.02. The finding was not significant at p = .36.

Table 10

Codebook Structure by Major Categories

Major category	Code structure
Aiding evidence-based practice	• Group support • Previous relevant training • Leader expectations • Task fit • Opportunity to apply • Application aid • Structuring work
Barriers to evidence-based practice	• Role constraints • Lack of practice • Lack of group support • Lack of information • Lack of opportunity to apply • Time constraints • Disconnect between research & practice • Evidence base already applied • Lack of work motivation • Lack of experience

Communicating information	• Evidence-based practice references
	  o Evidence-based practice as culture
	  o Evidence-based practice initiative
	  o Examples of evidence-based practice
	  o Examples of not being evidence-based
	  o Motivation or goal for evidence-based practice
	  o Opinion of evidence-based practice
	  o Precursors to evidence-based practice
	• Making claims
	• Using evidence
	  o Evidence preferences
	  o Evidence use norm
	    ▪ Brainstorming research ideas
	    ▪ Cognitive-based knowing
	    ▪ Communicating evidence norm
	    ▪ Evidence type
	    ▪ Lack of questioning evidence
	    ▪ Research literature norm
	    ▪ Supporting research use

- - - Vague mentions of evidence
  - General evidence reference
  - Opinions on evidence communication
  - Specific evidence use reference
  - Forms of evidence used
    - Academic research
    - Expert advice
    - Mixed evidence use
    - Organizational data
    - Outside advice
    - Personal experience
    - Personal values or interests
    - Rational explanation

Contextual factors	- General time constraints - Lab characteristics - Lab affiliation - Lab role - Meeting types - Lab meetings - Working sessions - Organizational culture - Other context - Lack of opportunities to pursue interest - Lack direction - Philosophy on research - Reason for joining organization - Tool reference - References goal(s) - Task type - Coaching function - Describes a decision - Describes general project or task - Human resources task - Initiative reference - Management task - Team culture - The leader

Evidence-based training	- Modules - Focused questions - Evidence search - Evidence evaluation - Outcomes - Changed perspective - Improved work performance - Increased authority - Makes work easier - Skill increase - Spreads training to others - Training applied - Organizational application - Personal application - Reactions - Affective evaluation - Negative - Positive - Opinion of training application - Pre-existing training - Questioning content - Training usefulness - Recommended improvements - Application tools or resources - Better customize training to context - Change order of presented material - Explain organizational relevance - Group training - Incorporate missing content - Increase engagement - Reinforcement training - Shorten training - Training follow-up notice - Training timing
Gathering evidence	- Access to evidence - Evidence gathering norm - Evidence gathering preference - Evidence gathering process - Sources of evidence - Asking clients - Asking experts - Books - Coworker feedback (direct) - Created survey

- o Gathering research
- o Internet
- o Interview data
- o Observational data
- o Pilot testing
- o Radio

Responding to arguments

- Asking questions
  - o Asking for information
  - o General questioning
  - o Technical questions
- Evaluating evidence
  - o Communicates reaction
  - o Comparing relative value
  - o Evidence preference
  - o Expresses interest
  - o Favorability of response
  - o Focus on evidence use process
  - o Focus on relevance
  - o General quality
  - o Group expectations
  - o Identifying implications
  - o Interpreting evidence
  - o Providing alternative evidence
  - o Reputation of conveyor of evidence
  - o Research design
  - o Source of evidence
- Peripheral influences
- Providing support
- Response to claims
  - o Acceptance of claims
  - o Changing topic
  - o Favorability of response
  - o Lack of response

Table 11
Evidence-Based Training Impact

Themes	Illustrative quote
Changed perspective	It was an aha moment for me to frame how research can be conducted.
Ease of work	It makes life easier in terms of searching for what you are looking for, in terms of the knowledge you have to differentiate, ok this is good, this is bad, I should spend more time on this, less time on this.
Improved work performance	Trying to get research on it [search engines] was very difficult, so that helped, in terms of just narrowing down and actually getting relevant articles to cite. And base my portion of the strategy or the rubric on.
Increased authority	It also gives you, because everyone in here is trained in research, it also gives you that, no, what I am saying is legit. So that extra authority. And they want that too.
Increased skill level	I used what I learned from training ... how to read a research article.
Spread of training to others	I also tell people how to find the meta-analysis and the meta-analy* [search term], yeah that one really helped me as well, and then I transfer my skill to some of my colleagues, ok you can find it this way.
Training application - Personal	I know that using it in my coursework, being able to frame the question and narrow down my options has really helped me identify studies.
Training application - Organization	When I did the evidence-based initiative, I did have to do some literature review type things, and I did the block [search method].

Table 12
Sources of Evidence

Themes	Illustrative quote/behavior
Books	(*Observed Researcher Note*) Facilitator initiates breakout working session, but question from the group leads to searching in a reference book '70:20:10 Framework Explained' to find examples from the first question discussed in the meeting.
Clients	I think the main place I apply this work around [the organization] is actually in coaching people, literally in the sessions. In trying to help people think about their, what's facing them. And, to try and deconstruct the problem, and I do this because it is coaching and not consulting, I do this in the form of questions - it helps guide what questions I ask.
Coworker feedback (direct)	(*Observed Researcher Note*) Reviewing documents from one member in person (value-based recruitment document) – showing document on the screen and asking for feedback.
Created survey	I primarily focus on the evaluation components of [the] labs, so all of the internal components like the exit survey, the engagement survey, those are the two big things we are doing right now. Trying to get those out and actually try and get responses back.
Experts	Yeah, because I know some of the interns I am working with, if they have a question they just ask me. They ask me directly versus spending hours trying to figure it out. They do still try to figure it before they ask me, but I think you just hit a wall where you just need to ask someone. That's what I see everyone else doing too. If they don't know, they will ask someone else who might know. But I also see just contacting experts, because the worst thing that can happen is that they just don't respond to you.

Internet	Most people would go to the website or just talk to people so that they can do it right away so they can make a quick decision based on the information they have.
Interview data	We went about that by brainstorming questions as a group, and we each did a series of interviews with different leadership development practitioners, and analyzed our notes.
Observational data	I was an assessor of the [client] project, so we analyzed recorded data [on video recordings] and did inter-rater reliability.
Pilot testing	You have to look at why coaching is important, how do you pair up members, and now we are currently doing a pilot study, kind of using results from that pilot study to inform us, any changes, improvements, what's good, what's bad. But I think once we launch it, we really have to see how we can, depending on how it goes, do we need to go back and look at research on coaching ... Looking at, well if it is not going well, how do we improve it.
Radio	If I am going to be making claims, then I would rely on journal articles and published studies, but if I am just talking ideas or talking more about theory, then I listen to a lot of TED talks, NPR, things that come up on the radio, but with the caveat that I am not trying to make any causal claims, just this is interesting have you heard of this?
Research	That's really how I go about it, but I in general around most things, I very strongly look towards the academic evidence to sort of guide me as much as I can.

Table 13
Forms of Evidence

Themes	Illustrative quote/behavior
Academic research – Empirical paper	They recently shared with the lab an empirical paper in which he is the first author.
Academic research – General research	I don't know, I think for the assessment part. We were trained to just use BARS, so the Behavioral Anchored Scales, so we know that is set, we rely on that. It has been developed from research, through research measures.
Academic research – Research findings	There are two resources out there in the world, two, resources on how to collect [research] data. One of them is an actual experimental study which shows that doing a specific model of asking a question, didn't change or provide different results for something.
Anecdotes	A lot of what I use are stories because I am currently in an internship…, and when we get together we share a lot of personal stories. I find that a lot of personal stories I can translate to, "oh it's this theory by author x,y,z or that's been studied through these research questions" so it is funny how you can actually apply that evidence just through personal stories that you hear from people. Especially from the population you are used to studying to, so I think that is pretty cool too.
Experts	Gather data from the employees, from the leaders, figure out what they feel, what their impression of the situation is, and figuring out, you know, how Scriven says you gather perspectives from a whole bunch of different things in order to figure out what is actually going on.
Mixed evidence	Yeah, yeah, research evidence. But sometimes the research evidence doesn't really tell us much, so sometimes we have to base it on experience too. But I would say mostly the research evidence base. But then your experience comes in when you did all this research, but it doesn't really help you

	with what you are trying to get to. And after that I guess I have to use my experience.
Organizational data	Yeah, inferential statistics, data, yeah. I mean if it is organizational data that you can't make any kind of inferences from, then you just have to present it descriptively. I still like that descriptive data. I still like putting numbers to things.
Outside advice	Going to other people and seeing how would you do this? I have to do this but I don't know what to do. So using them as sources. But I think that's really it, just having those resources to help, essentially just focus on something, because doing key word searches, you're just like, I don't know what pairings are going to give me what I want, is time consuming. No one has time for that (laughs).
Personal experience	She brings up experiences by the coaching lab sometimes. I can actually recall a specific experience she had with a leader in China was radically different than the experiences described in a study. Which was actually an interesting piece of evidence because it brought up the point that this research is Western-centric and may not capture all different leaders. And even though it was a personal story, it did make us think about the article a little bit differently. That is kind of an interesting example I guess, because the weight of the story really did matter.
Personal values or interests	(*Observed Researcher Note*) The [manager] mentions that they don't know for sure. Instead they reference their own preferences for the lab, and what would make them feel better about the situation [regarding lab turnover].
Rational explanation	It is like sports. As a practitioner, I am out on the field trying to make plays. I am trying to use psychology, I am trying to embody it in a way that will actually make a difference and make things happen. A lot of what we do in the academy is that we are fans talking about what seems to

happen out there and making theories about it. I don't mean that in a self-aggrandizing way - I am just saying that it is a different relationship to what is true. So as a practitioner you are not saying, I run into people all the time around [the university] that say does coaching work, and I can't really be worried about that because I am out there coaching. So obviously I try to make it more, try to use what I can, but a lot of the evidence we have in coaching is not directional. It is not if you do this rather than this, you will have more effective coaching. It doesn't direct the plays on the field.

Table 14
Evidence Evaluation Factors

Themes	Illustrative quote/behavior
Communicates reaction	(*Observed Researcher Note*) Another lab lead communicates that they are surprised based on their perception that coaching was a popular team to join.
Comparing relative value	I think it helps to convince people. A person cannot be 100% convinced because another person reads evidence from a published article, but of course if they say I saw an experiment that was conducted in blah blah blah, other people will say ok it sounds reliable or more convincing than people who talk about their own experience.
Evidence preference	The people I work with, so the other members in lead, they also want the, oh that's the citation so they know, it makes them feel better, this is based off of something, not just what you think. And I think that's just more because we are all research-minded, some of us are more practical, like applied, but since our training, it is more of a research focus.
Expresses interest	(*Observed Researcher Note*) Discussed a lot of people being interested in the paper, waiting for it to be published. Sounded like mostly academic audience and interests.
Favorability of response	The part about the evidence was my own personal thought, but the whole group all thought it was interesting from her. No one was dismissing it as that is just your experience and no one cares.
Focus on evidence use process	When people show me ideas, things in [organizational] meetings, I think I pay attention to see how they cite or use research evidence in their talking.
Focus on relevance	I think we would take into consideration what organization it was, and the topic, how big or small the topic is, and how much it relates back to [the organization]. And how much of that information we can use.

General quality	Being able to evaluate research out there, it is peer-reviewed research, but those peers can be fallible too, so it is important for each individual who reads research to really consider the quality of that research. I think it is absolutely crucial, so I think it is something everyone should be doing.
Group expectations	I think the culture itself, too. I don't know about other labs, but with research lab we really have that culture of like, what is the nature of the information you present here, the research you present you for sure have to do some literature review, and make sure that you gather information before you share something or try to come up with hypotheses, right.
Identifying implications	Sure, I think that comes up the most, at the beginning of the year, when we would read articles every week, or every other week, and during that time, those things would come up, the evaluating evidence part, trying to come up with the takeaways and the implications.
Interpreting evidence	(*Question from Researcher*) So you're saying that if nobody asks a question about it, then you generally have a hard time telling if somebody is using research when they are making a claim or using evidence, or if it is coming from their own experience? (*Participant Response*) Yeah, and I mean unless I have the knowledge of where it is from myself, I can't know where they are pulling it from for sure. I can assume the best motive, which is what I tend to do, but I can't know for sure. You know what I mean?
Providing alternative evidence	When people say ok my experience makes me feel like that, or my experience shows me that, people usually will discuss that opinion, but also say something else, but also say my own experience is a little bit different. It is hard to get to a compromise if people are using their personal experience.

Reputation of conveyor of evidence	I don't know if its maybe because I am kind of known for something, I don't know, or the seniority thing, maybe not, but I know for the coaching stuff, I did a really quick literature review. And they were like ok, that's cool. Like they accepted it without any question, so I don't know if it's like oh we trust that you know how to do this and this is what you found. I think it's more of that, and I am a consistent worker and I consistently work hard, so that can also be like that reputation thing, that even if I did this really quickly, I think I had a day or two to do it, then they are like ok if that's what you found then that is what we are going to go with.
Research design	One barrier though I think folks in organizational psychology face is when you, and I don't know how the picoc method could help with this, but sometimes you read really fluffy articles that are not meant for researchers, they are meant for practitioners and you can't evaluate the quality of the research because there is not enough information there. So I guess there is nothing that the picoc method can do to help with that, but it's. I am just thinking about reading HBR articles, can I even take what their conclusions are seriously when I don't know what the research design was, I don't know what questions they asked, I don't know what measures they used, I don't know anything.
Source of evidence	Most of the time when I interact with people in the research lab, ... every time two people talk about research, people care where those resources come from, where the evidence comes from.

Table 15

Barriers to Evidence-Based Practice Comparison

Current study	Barends et al., 2017
Disconnect between research & practice	Lack of time
Evidence base has already been used	Inadequate understanding of scientific research
Lack of experience	Readability of journals
Lack of group support	Organizational culture
Lack of information	Accessibility
Lack of opportunity to apply	Awareness of research as a resource
Lack of practice	
Lack of work motivation	
Role constraints	
Time constraints	

Table 16

Facilitators of Evidence-Based Practice

Themes	Illustrative quote/behavior
Application aid	If you have some sort of database, that could be helpful and make it easier and make them want to read more.
Group support	I think it was something that instilled in people in the research lab from day one, something that is important, if you are a member of the research lab you got to think critically about what's out there. I think the research lab does a good job of practicing what you are teaching.
Leader expectations	At first it is kind of like, we have this initiative. What should our approach be on it? And then the leader of the group will always be like, we need to look at the evidence to see, why are we doing this, why is it important?
Opportunity to apply	To be an organization somewhere outside of a research institute, we might be able to complete this in 1-2 years. But because this is a research institute, we are doing research already. We are always starting from scratch. We all have to review the literature, we have to spend some time reading literature.
Previous relevant training	Also, it is part of [the university], part of a research institute, part of who we are. And that's why I don't think it is something I have to spend some effort trying to implement that you teach in training. It just happens so naturally. It is not like I need to spend extra time to try and apply it.
Structuring work	I think it is just making sure you have the allotted time to do it. Making sure that you devote office hours, a certain number of office hours every week to doing that research. I think it would be important to have, at least for me, maybe this isn't true of all students, but to have a dedicated time to come in and put in that research time at [the

	organization]. To have two, four, office hours a week and do that.
Task fit	Well I think there are initiatives that are better suited, like they do seek out the, specifically like the research question and initiative, and making sure that the evidence base is sound and curated.

Table 17
Training Improvement Suggestions

Themes	Illustrative quote
Application tools or resources	I might have to ask you again for some more resources or the handouts again.
Better customization of training to context	I think the example you provide in the training, I know you got it somewhere, but perhaps if you customize it to the population. For example, we are studying leadership and leadership development. Maybe some of the examples that we practice on the training module online could be a paper on leader self-development or something. Something that is more relevant, something that would be read by people anyway. I think it might make people feel more engaged, I think. Or like, let's say you present it to the assessment lab, maybe one paper. Maybe it is really relevant so they might view this as part of the work I do anyway so might as well spend some more time on the training.
Change order of presented material	Have the online module first. Just because that sets the tone and expectations for what is credible, which helps to guide what you actually look at when you are picking out those various studies.
Explaining organizational relevance of the training	Letting people know that this training is part of what's going on to help people all be on the same page on how to use stuff. I don't know, I think it would have pushed it more. Made it easier.
Group training	I think if we are all together, especially if our focus is on research and evidence, I think if we are sitting together and we are learning this training, how can we apply it. So, I think we would definitely use it together, especially as a group. We would be able to say, "hey let's use this technique to help form our hypotheses for this paper" because it is just right there and everyone is there together using it.

Incorporate missing content	I didn't feel like it was incorporating qualitative data, or validating data as a data source, because it felt like I was looking at things going oh yeah that kind of information does seem like it would have some merit. And it was like, no, this does not have, it is lacking these qualities, but I was like yeah but that, those qualities are things that qualitative data wouldn't necessarily need.
Increase engagement	I am not really a game person, but maybe if it was more gamified. Or really just changing the context a little bit, so it goes from textbook to something more engaging. So internet deliver it obviously, that's not the problem, but more situational, again that art piece that is often missing from academic things, that helps people stay engaged with the things before them.
Reinforcement training	I think for me it takes more than one time hearing something before I really understand it or commit it to memory, so it is just that. Like more exposure to material is, for me at least and my own individual learning preferences is what's going to be helpful.
Shorten the training	I think that as far as the training goes, the only other thing I struggled with, was getting to that point where it's like ok let's go to the next exercise, read these five studies or whatever it was and look through all of them and scan them and then answer questions about all of them, and we are going to do this three more times after this. And that was just so daunting that I was like, I need to come back to this, because I was planning on doing it in a sitting or two. But I am a pretty slow reader. It's like I enjoy reading research, but if I am putting time into doing like an at-home questionnaire thing, unless it is something that is necessary for me to do for, I don't know, it is just difficult to get myself to put in as much time as it would require.
Training follow-up notice	I think it would be good if there was in between a reminder or maybe another email or handout, like "oh remember when we did the training on focused questions, how is that going?"

	Maybe something just to follow up and remind us to use that skill.
Training timing	It would be good if it [the training] was in the first year [of joining the organization].
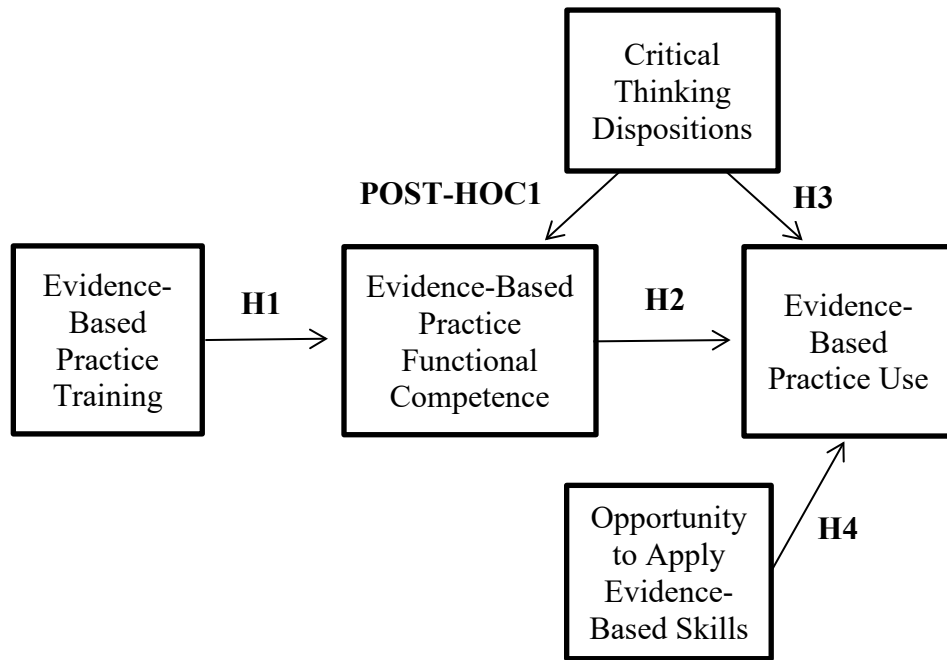
Figure 1. Quantitative Model of Evidence-Based Practice Training Effects
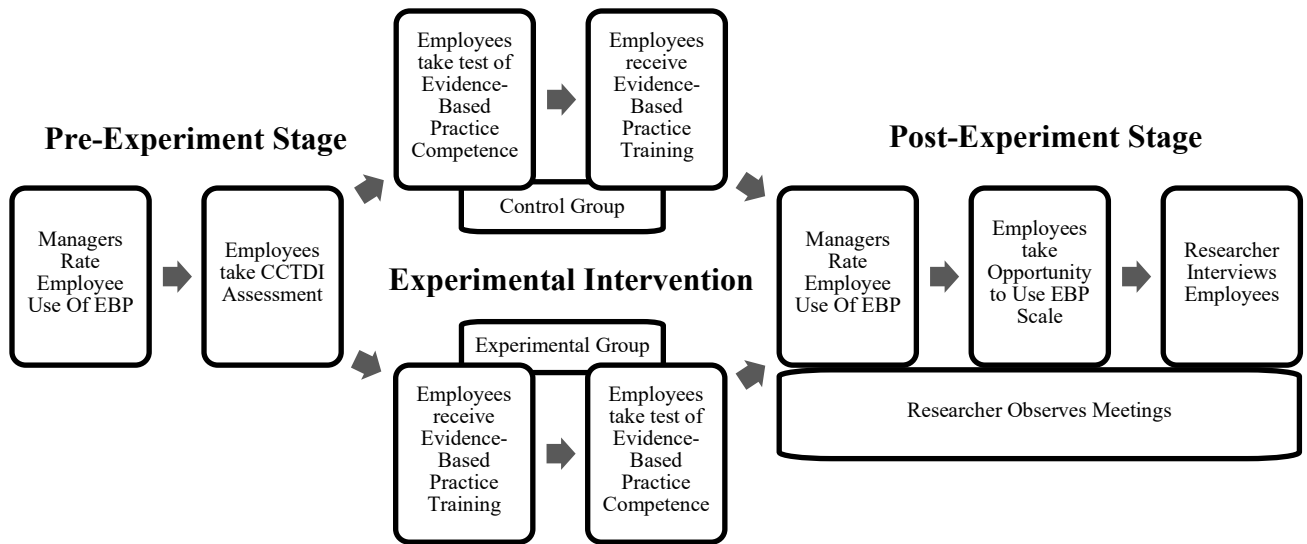
Figure 2. Procedures for Study Participants

Figure 3. Gathering Evidence Thematic Structure
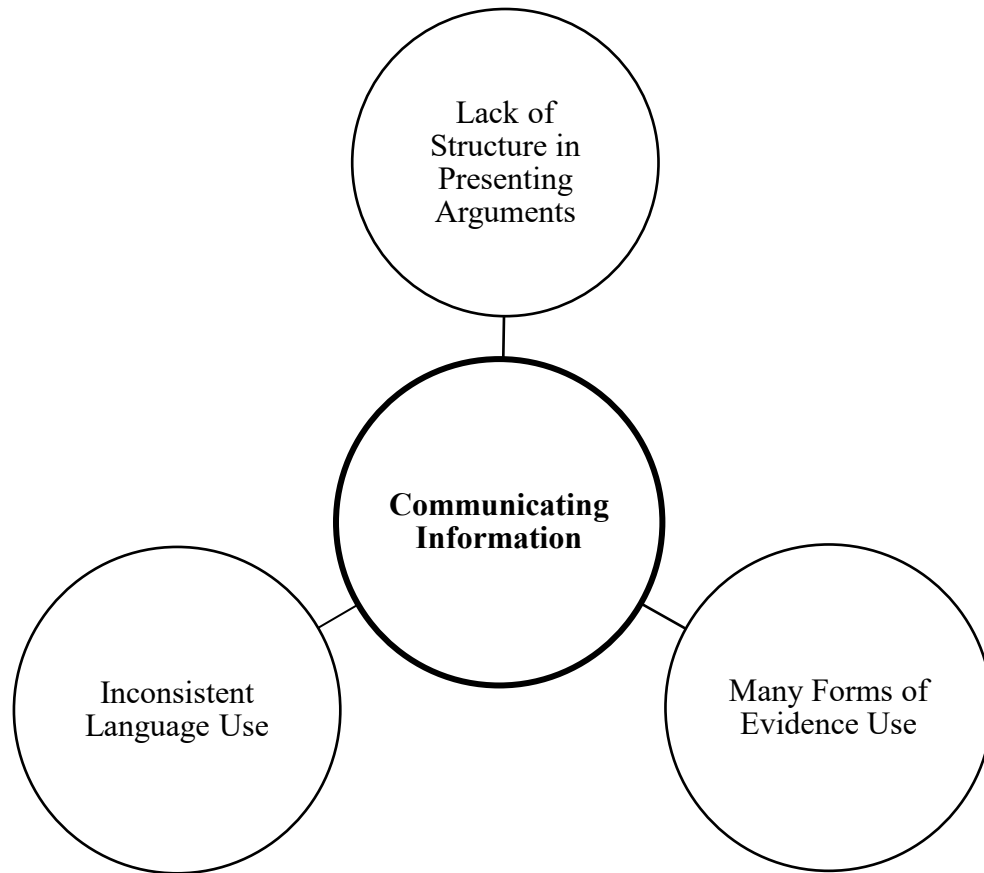
Figure 4. Communicating Information Thematic Structure
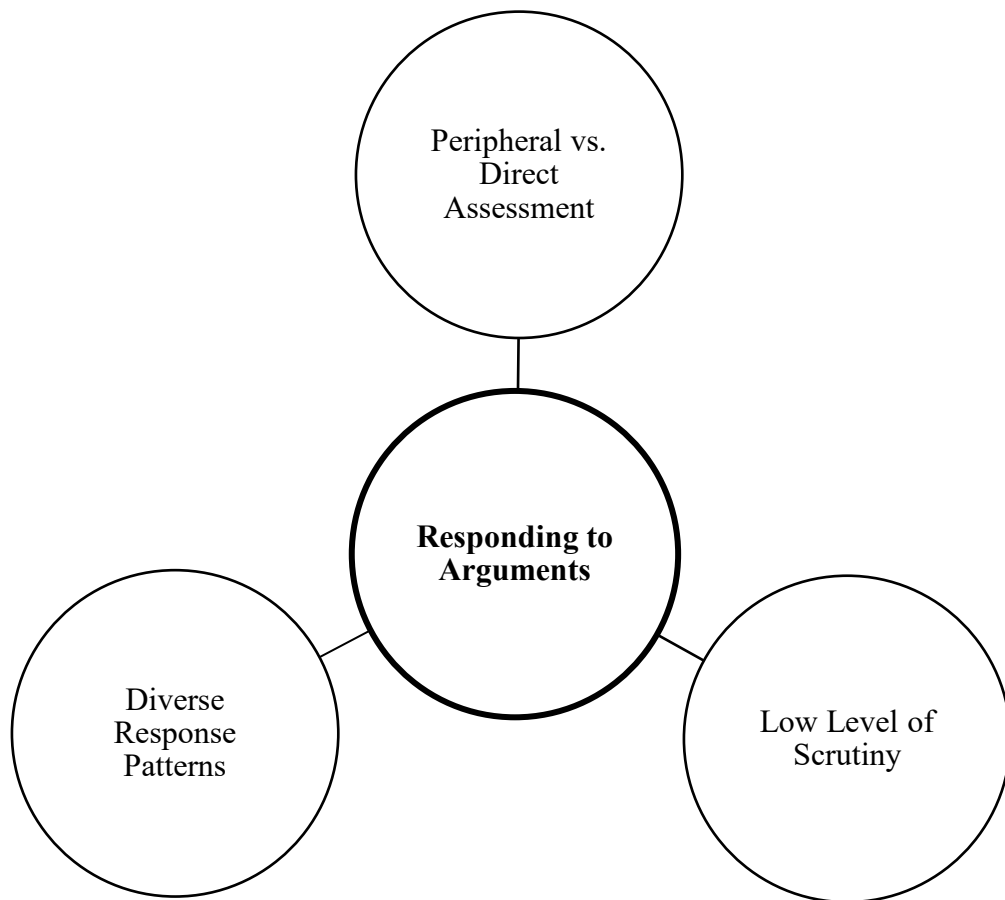
Figure 5. Responding to Arguments Thematic Structure
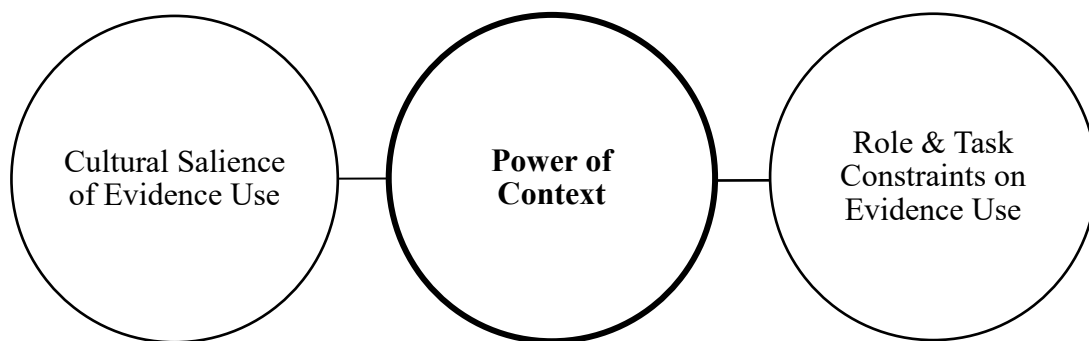
Figure 6. Power of Context Thematic Structure

Appendix A: Training Outline

Training Sequence:

1. Module 1: Introduction to Evidence-Based Practice (offered to all participants)

2. Module 2: Formulating Questions & Evidence Search

3. Module 3: Evidence Appraisal (online module from CEBMa)

Objectives:

1. Module 1:

   a. Build understanding of evidence-based practice concept

   b. Increase awareness of benefits of evidence-based practice

2. Module 2:

   a. Learn how to formulate a practice-oriented question

   b. Learn several search strategies for efficiently collecting evidence

3. Module 3:

   a. Determine a study's type (based on approach, methodology and/or design)

   b. Appraise study's methodological quality

   c. Summarize a study's design and findings, identifying weakness and methodological quality

   d. Rate the trustworthiness of a study

Curriculum:

1. Module 1:

   a. Define Evidence-Based Practice (EBP)

   b. Detail the Need for EBP

      i. How it benefits organizations

      ii.   How it benefits you

      iii.   Why it matters for [the organization]

  c.   Describe What We Mean by Evidence

  d.   Demonstrate What EBP Looks Like

      i.   Five steps to EBP

2. Module 2:

  a.   Overview of Steps in EBP

  b.   Why Question Formation and Evidence Search Skills Are Important

  c.   Formulating a Focusing Question – The PICOC Method

  d.   Where to Search for Evidence

  e.   Selecting a Search Strategy

  f.   Executing the Search Strategy

3. Module 3:

  a.   Putting It All Together – Overview of Critical Appraisal

  b.   Trustworthiness: Methodological Quality

  c.   Trustworthiness Summary

  d.   How to Read an Academic Article

  e.   Critical Appraisal – Practice Exercises

  f.   Critical Appraisal – Overall Summary

WHAT IS EBP?

Evidence-based practice is about making decisions through the conscientious, explicit, judicious use of the best available evidence from multiple sources [(CEBMa)]

- **Core Components of EBP:**
  - Critical thinking
  - Decision making skills
  - EBP specific skills (e.g., searching for information, assessing information quality)

WHAT DOES EBP LOOK LIKE?

- **5 Steps** [(Rousseau & Gunia, 2016)]
  - Translate practical issue into an answerable question (Ask)
  - Search for the best available evidence (Acquire)
  - Critically appraise the evidence (Appraise)
  - Integrate the evidence with your professional expertise and apply (Apply)
  - Monitor the outcome (Assess)

TRANSLATING PRACTICAL ISSUE INTO ANSWERABLE QUESTION (ASK)

- **Start with a practical issue or opportunity**
  - E.g., Supervisor asks you to address your leader shortage within organization
    - What is the underlying cause? (Bad leadership development, poor pay, etc.)
    - What are the potential solutions? (Succession planning, coaching, etc.)
- **Formulate a focused question to gather information**
  - Helps save time
  - Creates criteria for assessing 'best available evidence'

TYPES OF QUESTIONS: EFFECT

- Does it work?
- Does it work better than ....?
- Does it have an effect on ....?
- What is the success factor for ....?
- What is required to make it work ...?
- Will it do more good than harm?

TYPES OF QUESTIONS: NON-EFFECT

- Needs: What do people want or need?
- Attitude: What do people think or feel?
- Experience: What are peoples' experiences?
- Prevalence: How many / often do people / organizations ...?
- Procedure: How can we implement ...?
- Process: How does it work?
- Explanation: Why / how does it work?
- Economics: How much does it cost?

FOCUSED QUESTIONS?

- Does team-building work?
- What are the costs and benefits of self-steering teams?
- What are the success factors for culture change?
- Does management development improve the performance of managers?
- Does employee participation prevent resistance to change?
- How do employees feel about 360 degree feedback?

COMPONENTS OF FOCUSED QUESTION

- **Does team-building work?**
  - What is a 'team'?
  - What kind of teams?
  - In what contexts/settings?
  - What counts as 'team-building'?
  - What does 'work' mean?
  - What outcomes are relevant?
  - Over what time periods?

PICOC METHOD

- **PICOC**
  - Population
  - Intervention (or success factor)
  - Comparison Intervention (other possible solutions/options)
  - Outcome / Objectives
  - Context

FOCUSED QUESTION: PICOC

Imagine you are a consultant, your client is the board of directors of a large health-care organization. The board of directors has plans for a merger with a smaller healthcare organization in a nearby town. However, it's been said that the organizational culture differs widely between the two organizations. The board of directors asks you if this culture difference can impede a successful outcome of a merger. Most of them intuitively sense that cultural differences matter, but they want evidence-based advice.

PICOC METHOD

- P: What kind of Population are we talking about? Middle managers, back-office employees, medical staff, clerical staff?

- O: What kind of Outcome are we aiming for? Employee productivity, return on investment, profit margin, competitive position, innovation power, market share, customer satisfaction?

- P/C: And how is the assumed cultural difference assessed? Is it the personal view of some managers or is it measured by a validated instrument?

PICOC METHOD

- According to the board, the objective of the merger is to integrate the back-office of the two organizations (ICT, finance, purchasing, facilities, personnel administration, etc.) in order to create economy of scale. The front offices and primary process of the two organizations will remain separate.

- The cultural difference is not objectively assessed (it is the perception of the senior managers of both organizations).

PICOC METHOD

- **P** = back office employees

- **I** = merger, integration back office

- **C** = status quo

- **O** = economy of scale

- **C** = healthcare, different organizational culture, unequal

FOCUSED QUESTION

Does a difference in organizational culture affect a successful integration of back-office functions during a merger between two healthcare organizations of unequal size?

PICOC METHOD EXERCISE

- Read the following scenario's
- Formulate on the basis of each scenario a focused question (use the PICOC format).

PICOC METHOD SCENARIO 1

"I am a change and project manager at a local branch of a bank. The management of this particular branch struggles with low job satisfaction among its employees. Management has tried several initiatives to improve the situation. However, last year's Job Satisfaction Survey shows that these efforts have not resulted in any improvement. After the outcomes of the survey became clear, management organized a meeting with all employees to ask them one simple question: what, in your opinion, is important for your job-satisfaction? The meeting resulted in a focus on the following four topics: Trust, transparency, pride and fun. Employees and management together agreed that trust was the most important variable and decided to start from there. With my new found knowledge of evidence-based management, I ask myself this question: is there scientific evidence that shows that organizational trust indeed has a positive influence on the level of job satisfaction among employees in the private sector?"

PICOC METHOD SCENARIO 1

P: Non-Management Employees **I:** Trust-Building
C: Status Quo **O:** Job Satisfaction **C:** Bank Branch, Private Sector

Focused Question: Does a trust-building initiative implemented in a private sector bank branch context lead to increased job satisfaction for non-management employees?

PICOC METHOD SCENARIO 2

"I am a manager at a small IT firm (80 employees, annual turnover 10million USD) specialized in the development of risk reporting software for the insurance industry. The four owner-managers have a clear ambition to grow the organization further, but perceive the current organization as too bureaucratic and lacking in entrepreneurship. The chairman of the board has been told by a business friend who works in a large corporation that the concept of the balanced scorecard will help him to get the desired behavior of his employees. Intuitively, I seriously doubt if the concept of the balanced scorecard is applicable to and usable for small owner-managed companies. Before expressing my doubts to the chairman, I want to gather evidence supporting my intuition."

PICOC METHOD SCENARIO 2

P: Non-Management Employees **I:** Balanced Scorecard
C: Status Quo **O:** Organizational Growth or Decreased Bureaucracy, Increased Entrepreneurial Behavior **C:** IT, Small

Focused Question: Does implementing a Balanced Scorecard in a small IT firm context lead to decreased bureaucracy, increased entrepreneurship amongst non-management employees, and ultimately growth for an organization?

PICOC METHOD SCENARIO 3

"I am a quality manager at a large international brewery. In the past 4 years I have run a lean management program that has operated for more than 10 years in this organization. The program features a comprehensive training and development for teaching the tools/techniques of this approach and a central auditing function. The first years of the program saw very rapid progress and results. Since a couple of years, however, there has been a decline in results. For example:

- The number of problem analysis and improvement teams has been increased, but the amount of breakdowns and short stops in the production lines are the same.
- Progress in making quality improvements for Canada has slowed significantly.

According to the middle managers, the improvement program does not address the important organizational issues. I would therefore like to know more about the long-term effect of lean management in terms of organizational performance and reduced breakdowns."

PICOC METHOD SCENARIO 3

P: Employees **I:** Lean Management
C: Status Quo **O:** Organizational Performance, Reduced Breakdowns **C:** Large, Brewery, International, Long-Term

Focused Question: Does implementing lead management with employees in a large international brewery context reduce the amount of breakdowns and lead to increases in long-term performance of an organization?

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SEARCH FOR THE BEST AVAILABLE EVIDENCE (ACQUIRE)

- **Search Steps**
  - Starts with a focused question
  - Decide on what kind of evidence to look for
    - Studies with a design that best suits the focused question
    - Studies with the highest level of evidence
      - Emphasize finding evidence summaries (e.g., systematic reviews, meta-analyses)
  - Determine where to search
  - Create and implement search strategy (e.g., Snowball method)

WHERE DO WE SEARCH?

Type of Information	Source
Current Information	Wall street Journal, Financial Times, Business week, Financieel Dagblad
Overview of a subject	Textbooks and popular books
General background	Encyclopedias, yearbooks & book reviews
Academic Information	ABI/INFORM, Business Source Premier, Emerald, PsychInfo, Science Direct
Statistical Information	CBS Statline, Eurostat
Theories about a subject	Textbooks and encyclopedias
Company information	Company Annual Reports, Datastream, Factiva.com, Amadeus

SEARCHING FOR EVIDENCE

- **Why a Search Strategy?**
  - Promotes deeper learning about your question
  - Leads to better yield of quality research.
  - Saves time in the long run.
- **Types of Search Strategies**
  - Snowball method
  - Building blocks method

Snowball Method

BUILDING BLOCKS METHOD

PICOC Term 1	PICOC Term 2	PICOC Term 3	PICOC Term 4
Synonyms or related terms	Synonyms or related terms	Synonyms or related terms	Synonyms or related terms ....

OR OR OR

AND AND AND

START WITH PICOC TERMS

P = back office employees

I = merger, integration, back office

C = status quo

O = economy of scale

C = healthcare, different organizational culture, unequal

1. Underline the keywords

2. Number the order of importance

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PRIORITIZE KEY WORDS

P = back office employees

I = <u>1. merger</u>, <u>3. integration</u>, back office

C = status quo

O = economy of scale

C = <u>4. healthcare</u>, different <u>2. organizational culture</u>, unequal

1. <u>Underline</u> the keywords
2. Number the order of importance, select 2-4 key words

SEARCH QUERY

- Search with #1 term (incl. alternative terms, synonyms, alternate spellings, truncations, etc.) in the title
  - Search in title OR abstract if results are limited with only title
- Search with #2 term (incl. synonyms, etc.)
- Combine the results of step 1 and 2 with AND using the recent searches function
- Repeat above steps as necessary until reaching around 20-50 papers (less than 10 or more than 70 is usually inadequate)

BUILDING BLOCKS: BOOLEAN OPERATORS

- AND = both terms (apples AND oranges)
- OR = either one of these terms (apples OR oranges)
- * = replaces 0,1 or more characters (apple*= apple, apples, applejack, applejuice, applepie, etc.)

PRIORITIZE EVIDENCE SUMMARIES AND REVIEWS

- Filter for meta-analyses > "meta-analy*" in abstract
- Filter for "review" in title

SEARCH BLOCK 2

USE RECENT SEARCHES FUNCTION TO COMBINE RESULTS

TOO MANY RESULTS – BUILD BLOCK 3

SEARCH BLOCK 3

USE RECENT SEARCHES FUNCTION TO COMBINE RESULTS

Stop - Look For Keepers

SEARCH FOR META-ANALYSES

ProQuest

All databases › Business databases › ABI/INFORM Complete | Change databases

ABI/INFORM Complete

Basic Search   Advanced Search   Publications   Browse   About

S5 AND S6

☐ Full text   ☐ Peer reviewed ⓘ   ☐ Scholarly journals ⓘ   Modify search   Recent searches   Save search/alert ▾

Did you mean: (S3 AND S4) AND ab(meta-analy*)

1 Result   Search within   🗨 Cite   ✉ Email   🖨 Print   💾 Save

| Relevance ▾ | Sort | ☐ Select 1-1   0 Selected items | Brief view   Detailed view |

Narrow results

☐ 1   Do **Cultural Differences** Matter in **Mergers** and **Acquisitions**? A Tentative Model and Examination
Stahl, Günter K; Voigt, Andreas. Organization Science 19.1 (Jan/Feb 2008): 160-176,186.
...performance. The results of a meta-analysis of 46 studies, with a combined
Cited by (119)   References (127)

Abstract/Details   🔗 Full text - PDF (2 MB)   Preview ▾

Full text   ▾

Peer reviewed   ▾

BUILDING BLOCKS: SUMMARY

- Formulate a focused question and break it down into keywords
- Underline the 2 to 4 most relevant keywords,
- Make your first block with the most relevant keyword: search in title OR abstract.
- Repeat your search with alternative terms, synonyms or alternate spellings.
- Combine the outcome: (title OR abstract) + (alternative terms) with OR (use the recent searches function!) > this is block 1
- Maybe you are lucky: filter the results of block 1 with "meta-analy*" in the abstract or "review" in the title
- No luck? Build block 2 based on keyword 2 (see above)
- Combine block 1 with block 2 with AND (use the recent searches function!)
- Still too many results? Build block 3 based on keyword 3, etc. until you have around 20 to 70 papers. Read the titles & abstracts and select those that seem relevant

SEARCH EXERCISE 1

- **Search for meta-analyses on leader or leadership development in ABI/Inform Complete**

  - How many results?

SEARCH EXERCISE 2

- **Search in ABI/Inform:**

  - Search for peer reviewed research articles to answer the following question:

    What is the long term effect of a hostile take-over on the financial performance of the acquired organization?

  - Use the following search terms and look in <u>both titles and abstracts</u>:

    hostile takeover, financial performance, long term

- **How many studies did you find?**

SEARCH EXERCISE 2: ANSWER

- TI(Hostile takeovers) OR AB(hostile takeovers) = 324
- TI(Financial performance) OR AB(Financial performance) = 12820
- COMBINE SEARCHES 1 AND 2 = 13
- TI(Long term) OR AB(Long term) = 44,100
- COMBINE SEARCHES 3 AND 4 = 2

SEARCH EXERCISE 3

- **Search in ABI/Inform:**
  - Search for peer reviewed research articles to answer one of your focused questions from earlier:

- **How many studies did you find?**

Evidence-Based Management Questionnaire

Thank you for taking part in this questionnaire. The questionnaire consists of two parts. In the first part you will be asked for your opinion regarding the usefulness of research literature in the field of management and consulting. In the second part you will be asked about the extent to which you (already) make use of knowledge and skills related to evidence-based practice

The first part consists of 16 questions and takes about 10 minutes. The second part consists of 14 questions and takes about 20 minutes.

What is your name?

Part 1

In this part we will ask you questions about the importance you would attach to different sources of information. Please read the scenario below, and try to answer the following questions.

You have recently been appointed as director for a medium-sized business. In your first months working there, it becomes clear to you that the company is not organized in the best way. Overhead is too high, the accounting system is not working properly and profit margins have halved over the last two years. The Chief Executive Officer (CEO) wants this situation to change and is wondering whether the introduction of the Meyer-Whitney model could improve the financial performance of the company. Since you have never heard of this model, you decide to consult a number of sources of information before you give your advice to the CEO.

1. In a national newspaper, an article was recently published in which the famous American CEO of a large multinational company talked about his experiences with the Meyer-Whitney model. In the article, he says that since the introduction of this model, the stock market value of the company has increased by 20%.

How much importance do you attach to this information?

A great deal ☐ ☐ ☐ ☐ ☐ Very little

2. You contact a senior consultant at a well-known consulting firm. This consultant tells you that he does not think the Meyer-Whitney model has an effect on the financial performance of an organization. He advises you not to introduce the model.

How much importance do you attach to this information?

A great deal ☐ ☐ ☐ ☐ ☐ Very little

3. A case study published in a popular management magazine appears to show that the financial performance of a British organization showed a major improvement within a year after the Meyer-Whitney model was introduced. The result of this case study is based on qualitative research which consisted of interviews with the ten employees who were directly involved.

How much importance do you attach to this information?

A great deal ☐ ☐ ☐ ☐ ☐ Very little

4. A textbook from your study programme states that the Meyer-Whitney model is a good model for improving the financial performance of an organization.

How much importance do you attach to this information?

A great deal ☐ ☐ ☐ ☐ ☐ Very little

5. A recent study published in an academic journal shows that the Meyer-Whitney model has no significant effect on the financial performance of an organization. The study compares 20 organizations that have implemented the Meyer-Whitney model with 20 organizations which have not implemented it. Measuring the turnover and the profit margins before and after implementation showed that there was no difference between the two groups.

How much importance do you attach to this information?

A great deal ☐ ☐ ☐ ☐ ☐ Very little

In this part we would like to ask you questions regarding your use of scientific databases

6. With which of the following scientific databases are you familiar? (more than one answer is possible)
☐ ABI/INFORM van ProQuest
☐ Business Source Premier van EBSCO
☐ Science Direct van Elsevier
☐ PsycINFO
☐ ISI Web of Knowledge
☐ Econlit

☐ I'm not familiar with any of these databases (***proceed to question 8***)

7. How many times have you searched for research articles in these databases in the past semester?

☐ 0 times ☐ 1 - 2 times ☐ 3 - 4 times ☐ more than 4 times

In this part a number of statements are put forward about the applicability of scientific research. Please indicate the extent to which you agree or disagree with each statement

8. Every organization is unique, hence the findings from scientific research are not applicable.

☐ Strongly agree

☐ Somewhat agree

☐ Neither agree or disagree

☐ Somewhat disagree

☐ Strongly disagree

9. The results of scientific research are theoretically sound, but do not work in practice.

☐ Strongly agree

☐ Somewhat agree

☐ Neither agree or disagree

☐ Somewhat disagree

☐ Strongly disagree

10. Scientific research is conducted by researchers who are too far removed from the day-to-day work of a practitioner.

☐ Strongly agree

☐ Somewhat agree

☐ Neither agree or disagree

☐ Somewhat disagree

☐ Strongly disagree

11. Researchers investigate topics that have no practical relevance.

☐ Strongly agree

☐ Somewhat agree

☐ Neither agree or disagree

☐ Somewhat disagree

☐ Strongly disagree

In this part we would like to ask you some questions regarding evidence-based management.

12. Are you familiar with the term evidence-based management?

☐ Yes
☐ Somewhat
☐ No

Evidence-based management is often described as "*the conscientious, explicit, and judicious use of the best available evidence in making decisions about the management of individual organizations. The practice of evidence based management means the integration of research evidence with individual managerial expertise in the context of organization characteristics, culture and preferences.*"

13. How would you describe your attitude towards evidence-based management?

very positive ☐ ☐ ☐ ☐ ☐ very negative

Next, a couple of statements regarding your current attitudes towards evidence-based management are put forward. Please indicate the extent to which you agree or disagree with each statement.

14. Evidence-based management is not applicable for managers and consultants because their professions are based on hands-on experience and implicit knowledge.

strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree

15. Evidence-based management does not do justice to the personal experience and implicit knowledge of managers and consultants.

strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree

16. By using evidence-based practices, managers and consultants can improve the quality of their advice to clients.

strongly agree ☐ ☐ ☐ ☐ ☐ strongly disagree

PART 2

The second part of the questionnaire is about Evidence-Based Practice. The practice of Evidence-Based Management involves knowledge and skills related to searching and evaluating research literature. The following 14 questions are meant to assess the extent to which you are (already) utilizing these skills. Please read the two scenarios below, and try to answer all of the following questions to the best of your ability. You may find some of the questions challenging and you may not be familiar with certain terms. If you are unsure or don't know the answer to a question, simply leave it blank.

Scenario 1

You are working as a manager at a large brewery. The productivity of the operational workers is well below average for the sector. The Board of Directors wants to do something to improve this situation. The financial director suggests introducing a performance-related pay model, which would give the workers a financial incentive to carry out more work. You wonder whether productivity could also be improved in some other way, for example by introducing 'lean management'.

Scenario 2

You are working as the director of a large law firm with over 250 legal specialists. A benchmark comparison with other legal consultancy firms shows that the financial performance of the company is trailing a long way behind the competition. To improve this situation, you suggest introducing the Balanced Scorecard. The HR director thinks that introducing the Results Based Management Model will be more effective.

1) Write a focused question for ONE scenario to help you organize a search of the research literature.

Question 2) If you were to search a scientific database for research literature to answer your question, describe the search strategy you might use. Be as specific as you can about

1. the search terms you would use
2. which search terms you would combine and how
3. in which order you would search

4. how you might limit or filter your search

1. Search terms
2. Combinations
3. Order
4. Limitations / filter

3) What type of **study-design** would **best** answer the focused question you have described in question 1.

☐ cross-sectional research

☐ desk research

☐ multiple case-study

☐ controlled study

☐ I don't know

4) What type of **study-design** would **best** answer the following research question: *How many companies in the United States use activity-based costing?*

☐ quasi-experimental design

☐ qualitative research

☐ controlled study

☐ survey research

☐ I don't know

5) What type of **study-design** would **best** answer the following research question: *Why are health care workers, despite their low salaries, often very satisfied with their jobs?*

☐ desk research

☐ qualitative research

☐ controlled study

☐ longitudinal research

☐ I don't know
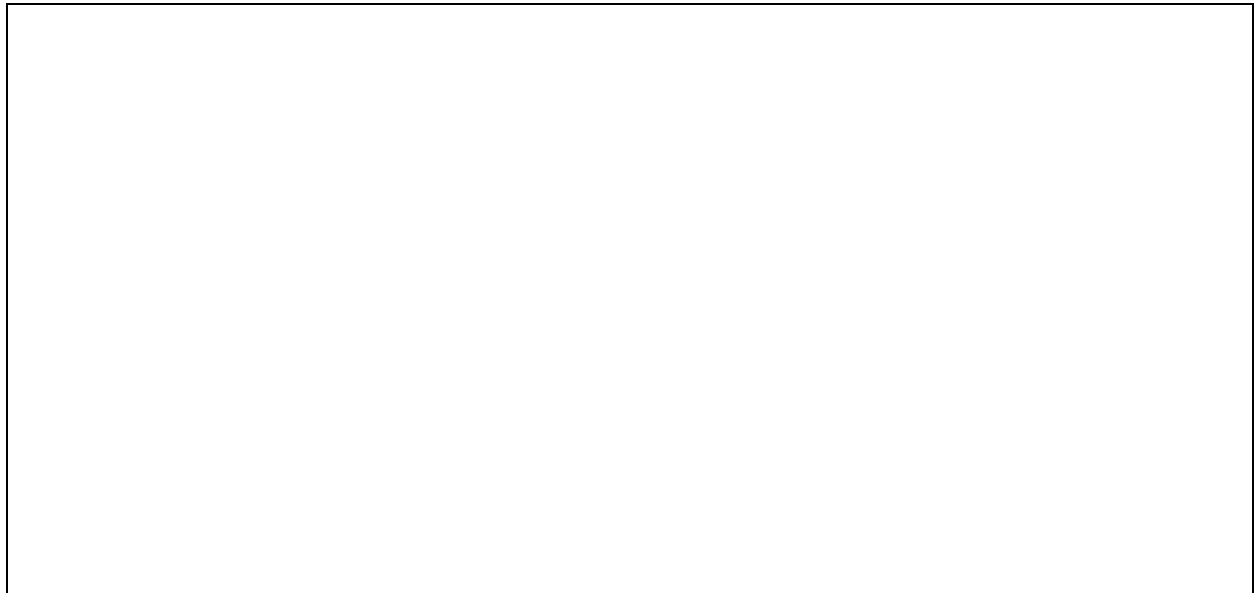
6) What type of **study-design** would **best** answer the following research question: *What are the long term effects of mergers and acquisitions on employee engagement?*

☐ multiple case-study

☐ cross-sectional research

☐ Delphi study

☐ longitudinal study

☐ I don't know

7) When you find a research article, what characteristics of the study will you consider to determine its **internal validity**?

8) When you find a research article, what characteristics of the findings will you consider to determine their **statistical significance** and **magnitude of the effect** described in the study?

9) When you find a research article, what characteristics of the study will you consider to determine its **external validity**?

10) When you find a research article, what aspects will you consider to determine if the findings of the study are **applicable** and/or **feasible** in your organization?

In this last part we would like to ask you some questions regarding statistics.

11) A study of the relation between 'servant leadership' and 'job satisfaction' showed a correlation of 0.68. The reported 95% confidence interval was found to be 0.40 to 0.80.

Evaluate the following two statements:

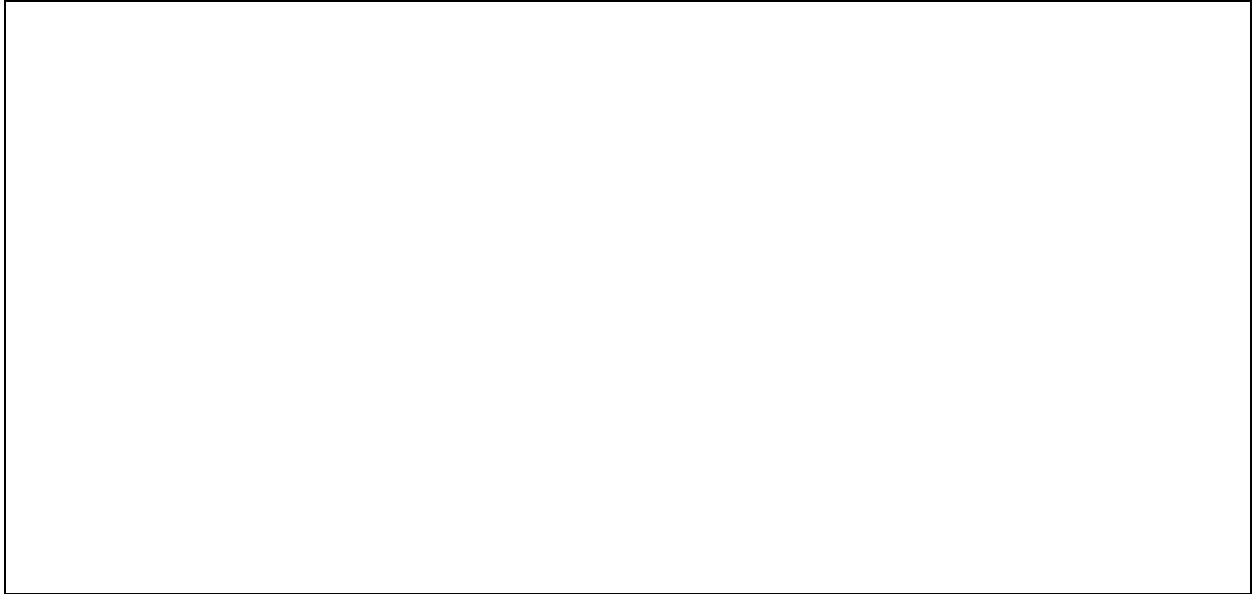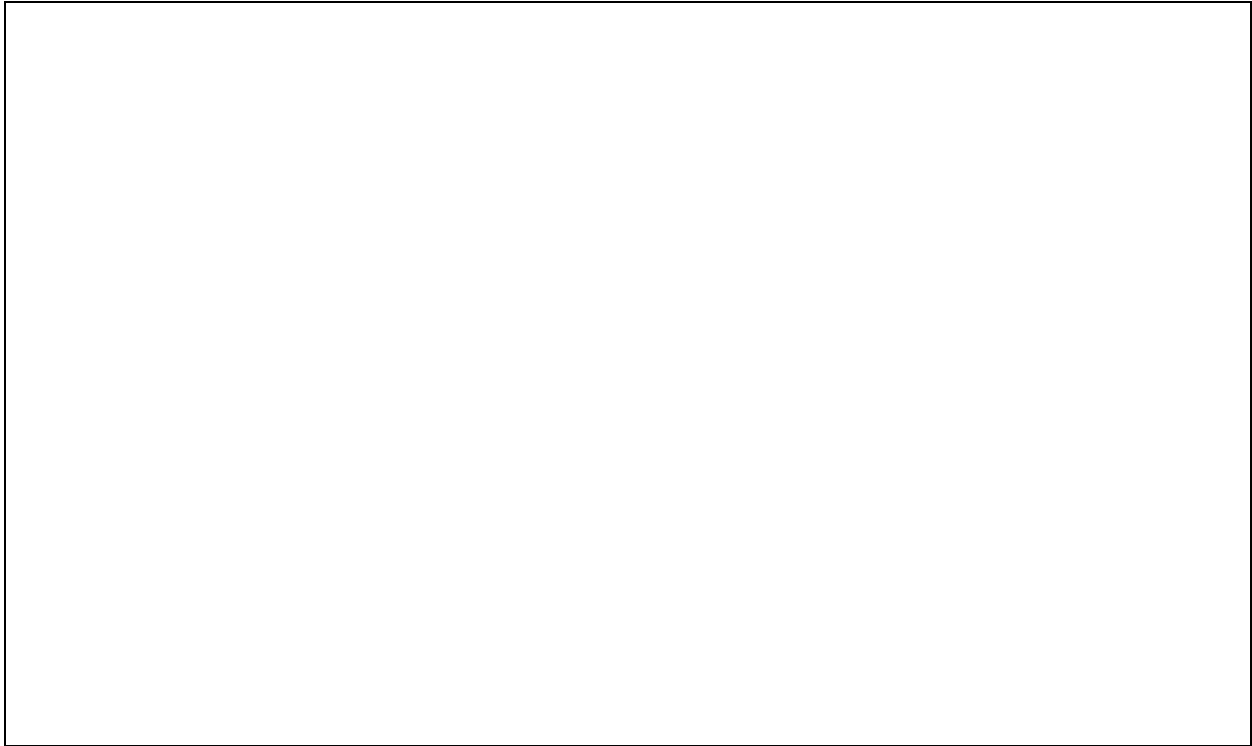A) A small confidence interval provides a more precise estimate of the correlation coefficient than a wide confidence interval.

B) A 95% confidence interval indicates that there is a 95% certainty that the 'true' correlation coefficient is 0.68

☐ Statement A is true

☐ Statement B is true

☐ Both statements are true

☐ Both statements are false

☐ I don't know

12) A study of the relation between "'servant leadership' and 'job satisfaction' showed a correlation of 0.68. The reported p-value was found to be more than 0.05.

Evaluate the following two statements:

A) The chance that the observed correlation is <u>not true</u> is more than 5%

B) The chance that 'observed leadership' has <u>no effect</u> on 'job satisfaction' is more than 5%

☐ Statement A is true

☐ Statement B is true

☐ Both statements are true

☐ Both statements are false

☐ I don't know

13) A certain town is served by two hospitals. In the larger hospital about 45 babies are born each day, and in the smaller hospital about 15 babies are born each day. As you know, about 50% of all babies are

boys. However, the exact percentage varies from day to day. Sometimes it may be higher than 50%, sometimes more. For a period of 1 year, each hospital recorded the days on which more than 60% of the babies born were boys. Which hospital do you think recorded more such days?

☐ The larger hospital

☐ The smaller hospital

☐ About the same (within 5% of each other)

☐ I don't know

14) As you know, about 50% of all babies born are boys. The order in which boys and girls are born in a hospital is obviously random. Now consider the following three possible sequences (B=boy, G=girl):

Sequence 1:   B-B-B-G-G-G
Sequence 2:   G-G-G-G-G-G
Sequence 3:   B-G-B-B-G-B

☐ Sequence 1 is more likely

☐ Sequence 2 is more likely

☐ Sequence 3 is more likely

☐ All three sequences are equally likely

☐ I don't know

This concludes the questionnaire.

Thank you very much for your cooperation!

PART 1

Importance of sources of information

Question 1:   A great deal   ☐   ☐   ☐   ☐   ☐   Very little
                              0 pt   0 pt   2 pt   4 pt   4 pt

Question 2:   A great deal   ☐   ☐   ☐   ☐   ☐   Very little
                              0 pt   0 pt   2 pt   4 pt   4 pt

Question 3:   A great deal   ☐   ☐   ☐   ☐   ☐   Very little
                              0 pt   0 pt   2 pt   4 pt   4 pt

Question 4:   A great deal   ☐   ☐   ☐   ☐   ☐   Very little
                              0 pt   0 pt   2 pt   4 pt   4pt

Question 5:   A great deal   ☐   ☐   ☐   ☐   ☐   Very little
                              10 pt   8 pt   0 pt   0 pt   0pt

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Use of online databases

Question 6:   2 points for every database mentioned

Question 7:   0 times   = 0 points
               1 - 2 times   = 2 points
               3 - 4 times   = 4 points
               > 4 times   = 6 points

Applicability of scientific research

Question 8 - 11:

strongly agree   = 0 points
somewhat agree   = 1 point
neither agree nor disagree   = 2 points
somewhat disagree   = 3 points
strongly disagree   = 4 points

Attitude towards evidence-based practice

Question 12:   yes   = 4 points
                    somewhat = 2 points
                    no   = 0 points

Question 13:	Very positive	☐	☐	☐	☐	☐	Very negative
		4 pt	3 pt	2 pt	1 pt	0 pt	

Question 14:	Strongly agree	☐	☐	☐	☐	☐	Strongly disagree
		0 pt	1 pt	2 pt	3 pt	4 pt	

Question 15:	Strongly agree	☐	☐	☐	☐	☐	Strongly disagree
		0 pt	1 pt	2 pt	3 pt	4 pt	

Question 16:	Strongly agree	☐	☐	☐	☐	☐	Strongly disagree
		4 pt	3 pt	2 pt	1 pt	0 pt	

PART 2

Question 1

When in doubt, consider whether what is written will contribute to an optimally specific search of the research literature. The elements 'Intervention' and 'Comparison' may be interchanged.

Points are awarded for each column, so in total 20 (5 x 4) points can be awarded

Scenario 1

	Population	**Intervention**	**Comparison**	**Outcome**	**Context**
Strong (**4 points**)	One or more relevant descriptions e.g. 'employees of a brewery' or 'operational workers'	One or more relevant descriptions e.g. 'performance related pay model', 'financial incentives' of 'pay for performance'	One or more relevant descriptions e.g. 'lean management', 'performance management' or 'quality management'	One or more relevant descriptions e.g. 'productivity' or 'production'	One or more relevant descriptions e.g. 'large (German) brewery' or 'industrial organization'
Limited (**2 points**)	One or more general descriptions e.g. 'employees'	One or more general descriptions e.g. 'reward', 'pay model' or 'incentive'	One or more general descriptions e.g. 'other model / intervention'	One or more general descriptions e.g. 'improvement', 'outcome' or 'output'	One or more general descriptions e.g. 'organization'
Not evident (**0 points**)	Not present	Not present	Not present	Not present	Not present

Scenario 2

	Population	Intervention	Comparison	Outcome	Context
Strong (**4 points**)	One or more relevant descriptions e.g. 'legal specialists' or 'employees of a law firm' or 'lawyers' or 'highly educated professionals'	One or more relevant descriptions e.g. 'balanced scorecard' of 'performance management'	One or more relevant descriptions e.g. 'Results Based Management Model' or 'performance management'	One or more relevant descriptions e.g. 'financial performance', 'profitability' or 'profit margin'	One or more relevant descriptions e.g. 'large (American) law firm'
Limited (**2 points**)	One or more general descriptions e.g. 'employees' or 'professionals'	One or more general descriptions e.g. 'management model'	One or more general descriptions e.g. 'other model / intervention'	One or more general descriptions e.g. 'improvement', 'outcome' or 'performance'	One or more general descriptions e.g. 'organization'
Not evident (**0 points**)	Not present	Not present	Not present	Not present	Not present

Question 2.

Points are awarded for each column, so in total 32 (4 x 8) points can be awarded

	Search terms	**Combination**	**Order**	**Delimiters**
Excellent (**8 pts**)	Mentions three or more terms from PICOC, and/ or synonyms	Mentions Boolean operators (AND and OR) as well as search history to combine terms	Describes the right order: - Thesaurus - Title - Abstract	Describes two or more methods of limiting search, such as: - peer reviewed - scholarly journals - language - date - study
Strong (**6 pts**)	Mentions two terms from PICOC and/ or synonyms	Mentions Boolean operators (AND and OR) or search history to combine terms	Mentions Thesaurus, Title and Abstract but does not describe the right order	Describes only one method of limiting search.
Limited (**3 pts**)	Mentions one term from PICOC and/or synonyms	NA	Mentions Thesaurus, Title or Abstract	NA
Not evident (**0 pts**)	Not present	Not present	Not present	Not present

Question 3: Controlled study = 4 points

Question 4: Survey research = 4 points

Question 5: Qualitative research = 4 points

Question 6: Longitudinal study = 4 points

Question 7

	Internal validity
Excellent (**24 pts**)	Describes at least both of the following issues: • Control group • Before and after measurement and two or more of the following issues: • Appropriateness of the study design • Randomization • Valid and reliable measurement/ outcome measures • Confounding • Bias • Sample size / power • Appropriate statistical analysis • When a study was conducted • Confirmation with other studies • A plausible theory
Strong (**18 pts**)	Describes at least both of the following issues: • Control group • Before and after measurement and one of the other issues mentioned above
Limited (**10 pts**)	Describes both of the following issues: • Control group • Before and after measurement
Minimal (**5 pts**)	Describes only one of the following issues: • Control group • Before and after measurement
Not evident (**0 pts**)	None of the above present

Question 8

Points are awarded for each column, so in total 24 (2 x 12) points can be awarded

	Statistical significance	**Magnitude**
Strong (**12 pts**)	Describes at least 2 indicators of statistical significance, such as: • p-values • confidence intervals • power / sample size • Type 1 or Type 2 error	Describes both: • practical significance and • effect size
Limited (**6 pts**)	Describes only one indicator of statistical significance	Describes only: • practical significance or • effect size
Not evident (**0 pts**)	None of the above present	None of the above present

Question 9

	External validity

Strong (**24 pts**)	Describes two or more aspects important to external validity:
	
	• Ecological validity / type of organization
	  e.g. fortune 500 organization vs non-profit organization or hospital vs manufacturing organization
	
	• Population validity / type of employees
	  e.g. blue collar workers vs autonomous professionals or physicians vs bank tellers
	
	• General psychological laws, which are applicable irrespective of population or type of organization.

Limited (**12 pts**)	Describes only one aspect

	None of the above present
Not evident (**0 pts**)	None of the above present

Question 10

	Applicability/ feasibility
Excellent (**24 pts**)	Mentions at least four issues, such as: • organizational facts and characteristics • cultural aspects • stakeholders' values and concerns • political aspects • financial aspects /cost-effectiveness / return on investment • priorities • change readiness / resistance to change • implementation capacity • timing
Strong (**18 pts**)	Mentions three issues as above
Limited (**10 pts**)	Mentions two issues as above
Minimal (**5 pts**)	Mentions only one issue as above
Not evident (**0 pts**)	None of the above present

Question 11: Statement A is true = 4 points

Question 12: Both statements are false = 4 points

Question 13: The smaller hospital = 4 points

Question 14: All three sequences are equally likely = 4 points

Appendix E: Sample California Critical Thinking Disposition Inventory Items

Truth-seeking

It's never easy to decide between competing points of view.

Being impartial is impossible when I'm discussing my own opinions.

Open-mindedness

It concerns me that I might have biases of which I'm not aware.

It's important to me to understand what other people think about things.

Analyticity

It bothers me when people rely on weak arguments to defend good ideas.

Others look to me to decide when the problem is solved.

Systematicity

People say I rush into decisions too quickly.

If I have to work on a problem, I can put other things out of my mind.

Confidence in Reasoning

I'm proud that I can think with great precision.

My peers call on me to make judgments because I decide things fairly.

Inquisitiveness

Studying new things all my life would be wonderful.

Learn everything you can, you never know when it could come in handy.

Maturity of Judgment

Reading is something I avoid, if possible.

Powerful people determine the right answer.

Appendix F: Opportunities to Use Learning Scale

For the following items, please think about the evidence-based skills training:

1. My workload allows me time to try the new things I have learned.

2. I have time in my schedule to change the way I do things to fit my new learning.

3. There are enough human resources available to allow me to use skills acquired in training.

4. Our current staffing level is adequate for me to use this training.

Appendix G: Perceptions of Evidence Use Scale

Question Stem: My lab member…

1. Makes decisions about workplace issues based on evidence

2. Tends to use evidence when implementing a new way of doing things

3. Tells me about the evidence for implementing a new way of doing things

4. Asks me for feedback or my opinion after implementing a new way of doing things

5. Involves me in research on workplace issues

6. Gives me the information on the success (or otherwise) of a trial or a new way of

   working

7. Likes to evaluate the success of a new way of working

8. Shares their experiences of workplace trials, changes, and new implementations with

   other organizational members

9. Uses scientific evidence in making decisions

10. Shares scientific evidence with me

11. Uses organizational facts and metrics in making decisions

12. Shares organizational facts and metrics with me

Appendix H: Evidence-Based Practice Experience Interview Guide

1. Please describe your experience implementing the things you learned in the evidence-based training modules.

2. How has this training impacted your ability to perform your job (if at all)?

3. What aspects of the training did you find most useful for your job performance?

4. What improvements to the training process or topics covered would have better prepared you to implement this training?

5. What characteristics or features of the organization you work for supported your attempts to apply the training on the job?

6. What are some of the most significant barriers you have faced in trying to successfully apply your training to your practices within the organization?

7. What would you need to better apply this type of training in the future?

8. Describe how evidence is applied?

   •   What types of evidence are used?

   •   What types of arguments is evidence being used to support?

   •   For what purpose is evidence being applied?

   •   How do others respond to the use of evidence from you or your colleagues?

   •   What consequences are there for using evidence?

Appendix I: Field Observation Guide

I. Describe how evidence is applied.

- What types of evidence are used?

- What types of arguments is evidence being used to support?

- For what purpose is evidence being applied (if indicated)?

- How do other meeting participants respond to use of evidence?

- What consequences are there for using evidence?

II. Describe what factors seem to be facilitating the use of evidence.

III. Describe the obstacles to using evidence.